

THE Telegraph and Telephone Journal.

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TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XXX.—

MR. W. M. SIMPSON.

MR. W. M. SIMPSON, Postmaster-Surveyor of Liverpool, entered the Civil Service through an open Competitive Examination and was assigned to the Accountant General's Department of the Post Office in October, 1888. In May, 1892 he was appointed to the Post Office Surveying Staff. In 1907 he was promoted to the senior grade of Assistant Surveyors, further promotion to the rank of Surveyor following eight years later. In 1919, he was appointed to his present post of Postmaster-Surveyor of Liverpool, a position which has been held in the past by several men notable in Post Office history, and whose high traditions are worthily upheld by its present occupant.

The task of a Surveyor in these days of multiple activities on the part of the Post Office is no easy or light one, for on him falls the onerous responsibility of ensuring in his district the harmonious and equable functioning of an organisation



which is necessarily a complicated one. Mr. Simpson holds that nothing conduces more to the good working of the service and the happiness of its members than the development of the "Get together" movement for Sport and Social purposes. He has made special efforts to induce all sections of the Post Office staff to combine for these objects and also to get the various Civil Service departments in Liverpool into touch with each other and so promote a spirit of camaraderie and esprit de corps throughout the Civil Service.

To this end he was largely responsible for the formation of the Liverpool Area Civil Service Sports Association (a branch of the National Civil Service Sports Council) and has been its Chairman since its inception three years ago. He is also Vice-President of the Liverpool Branch of the Institute of Public Administration, in the formation of which he was largely concerned, and took the chair last March at the first Civil Service Dinner held in Liverpool.

THE GLASGOW TELEPHONE SERVICE.*

BY A. E. COOMBS, *District Manager, Glasgow.*

General.—I propose dividing my address into three sections. First and very briefly a summary of our local organisation; secondly, the relations between the Public and the Post Office Telephones; and thirdly, the application of these relations in terms of efficiency and finance. In the latter case it will be necessary to quote statistics, but I shall endeavour to place the relative figures before you in an acceptable form and yet at the same time keep in clear view their important bearing on the main question of cent. per cent. efficiency.

Organisation.—There are three main branches in the Telephone District Organisation, the Accounting, Contract and Traffic.

The name "Accounting" explains itself. This branch deals with the rendering and payment of accounts and questions arising therefrom. Approximately 30,000 separate accounts are rendered to our subscribers each quarter. Incidentally it will be of interest to you to know that Glasgow compares favourably with other large cities in regard to prompt payments. The Contract Branch deals with the expansion of the service by the securing of new subscribers and improving the facilities of those already connected. This section is particularly concerned with development work. It has in Glasgow, and by means of exhaustive and skilled study, estimated the telephone requirements of the district for 20 years hence.

Development.—Our best present field is in regard to residential services. There is a great need for intensive and extensive expansion in that direction, and we are concentrating on this aspect of the case. The ladies are concerned more, perhaps, than the gentlemen, and to them we are appealing, for there can be no doubt that apart from its time and labour saving value, a telephone in the home gives a wonderful feeling of security to the wife and family and helps to remove that feeling of loneliness which attacks even the most optimistic of our womenkind. With such a help the wife will feel that she is at all times in touch with valued friends, for no feeling of loneliness need ever find a place in the house where a telephone is fixed.

Service.—The Traffic Branch is concerned with the service, and this may appeal to you as the Alpha and the Omega of all things telephonic. It is, of course, for without service the whole business is worse than useless. Our traffic people know this, and not only do they see you have service but that you get the best it is possible to give. Time will not permit detailing the many and important functions of this Branch; it may suffice if I say it is responsible for the organisation and work of our exchanges, the provision of circuits between exchanges, the investigation of complaints, the compilation and examination of statistics relating to service and equipments, and many other duties, all of which have, as their main objective, the promotion of an efficient and well-ordered telephone service.

May I at this point quote a few figures. Taking the country as a whole, there are to-day in use approximately 1,400,000 telephones; the number is being increased at the rate of over 9% per annum. The Glasgow figures are 53,000 and 5% respectively. We are at present falling behind in the forward march. I hope this state of affairs will soon be remedied. It is not a good thing for the Second City of the Empire to be a laggard in respect to any of its public services.

I now come to the second point.

Publicity.—For many years I have felt that there was paramount need for publicity from an inside point of view so far as our Telephones were concerned. Most of us are familiar, I expect, with the popular conception which—if you will pardon my saying so—is as far removed from reality as are the poles asunder; this is largely due to the unfortunate fact that the natural tendency among the majority of people is to think by proxy. The man who will not trouble to think for himself relies on scraps of information which he picks up from time to time. If these are of a humorous character, or take the form of cheap witticism or cynicism, all the better. In the final arbitrament, unfortunately, many humans build their ideas on foundations laid by other men. It is full time someone told a few stories from the other point of view. The road is not easy. There are natural difficulties; these will be overcome in due course, but they are present and must be recognised. One in particular militates against success. I refer to the risk of repetition. Nothing wearies an audience so much as the repeating of figures, phrases and platitudes. I must avoid this if I possibly can. I ask you therefore in advance to forgive any shortcomings in this respect.

Co-operation and Goodwill.—The phrase "Co-operation and Goodwill" occurs to me as a suitable theme on which to make a few comments. One might almost suggest that these terms were synonymous, but it is possible to get co-operation and yet have no goodwill; indeed, co-operation minus goodwill is something like a motor without lubricating oil. On the other hand it may reasonably be argued that goodwill implies and includes co-operation. I agree as to the implication but not as to the inclusion.

I hope to indicate later what mutual goodwill means and how much we can help each other toward the goal of maximum efficiency once we have removed the barriers—if any—of misunderstanding, mistrust, and prejudice. I am putting all the cards on the table, and if I do not misjudge the character of the Glasgow Business and Professional community, there will be reciprocity in full, so that we shall both benefit. There is, however, just a tiny suggestion, ever so tiny, gentlemen, that I would make, and it is this: when you discuss what we might have done and "did not" will you keep a small corner of your mind for what we have done, are doing, and hope to do? It may be *apropos* also for me to say at this point that though my stay in Glasgow has, so far, extended only to fifteen months, I have already learned to appreciate the sense of fair play and square dealing that actuates the business community of this great City. As a man from "Across the Border" I hope you will permit me to express that opinion.

"The Personal Touch."—How may we best secure the co-operation and goodwill of all concerned? I suggest "the personal touch." All my official life I have had a profound belief in the efficacy of the personal factor, and its comparative absence up to now in the relations between our subscribers and ourselves is one of the greatest handicaps to the advancement and development of our service. It is not enough that you should know the machine that provides your daily telephone service; it is not enough that we should know you in the mass. We may even study each other very closely and yet know very little about one another.

Too long, I fear, have we appeared to you as a huge machine minus a soul; an organisation; a system; a thing; a business machine with neither humanity nor feeling; a nuisance to be endured because it could not be cured. Maybe we are at fault in permitting such an idea to take root and flourish, for, on our side, and more particularly in those places where we have been subjected to unreasoning criticism and anonymous sarcasm, we just retired a little further into our official shell. After all, we are just as human as yourselves and equally sensitive to undeserved censure, particularly of the anonymous variety.

How very wrong it all is. How tragically silly and short-sighted. If this atmosphere obtains in Glasgow we are badly adrift, and the sooner we change our respective points of view the quicker shall we get on the course which leads to the desired end. One of the few good things during the recent war was the collapse of many pre-war artificialities. A common danger showed to all and sundry the hollowness of numerous cherished traditions. The danger in regard to our Telephones may not savour so much of the physical life and death risk, but the handicap of artificial barriers to the efficiency and progress of our service is of sufficient importance to the business and advancement of our country to warrant the removal of all superficialities that tend to retard progress in the smallest degree.

Visits to Exchanges.—If, by some magic, our positions could be reversed, "you in my small corner and I in thine," what a wondrous broadening of outlook and deepening of ideas would follow. How quickly each of us would be disillusioned and how soon we should appreciate what we had lost. What different opinions we should form as to each other's hopes, worries, and fears, and last, but not least, how grateful the majority would be to get back to their own routine, and in the future, how carefully we would walk and talk in respect of and with respect to each other's duties and responsibilities. A change of this sort would, I fancy, work wonders in spheres of modern life far removed from the telephones.

Unfortunately, we cannot reasonably anticipate such a happening, and we must therefore apply ourselves to the next best thing and endeavour to put our respective points of view so that, short of an actual interchange of responsibilities, we shall see things from each other's angle of vision. This is the prime factor underlying the oft-repeated invitations to you to come along and see us at work; to give us, and particularly the officers operating your calls, the chance of meeting you. I venture the opinion that there would be mutually pleasant surprises, and that the general effect of such interchanging of views could not fail to be productive of maximum benefit.

I again therefore extend to you a cordial invitation to visit our Exchanges; come and see the staff handling the telephone business of the City, and at the same time help us to maintain and strengthen the bond of reciprocal understanding which is the best, if not the *only* way, of attaining cent per cent. efficiency.

Originality.—It is not always easy to find something new, but originality is not everything, for it is possible to be original without adding anything that is new to one's real knowledge of telephony, or to the efficiency of the service. Is it not Carlyle who says "the significance of originality does not lie in newness so much as in sincerity." I wish to make that the keynote of my address, so if some of my phrases savour of repetition will you accept them as indicative of a sincere desire to place before you facts and figures relating to our work.

Telephone as a Trade Barometer.—The telephone is an excellent trade barometer. Its usefulness in that regard is not restricted to yesterday's business weather, but to-day's, and what may be expected to-morrow. Experience shows that the rise and fall in telephone calls and the acceleration and retardation of development coincide with the fluctuations of trade, and with the waves of optimism and pessimism which attack all of us at some time or another.

As a nation we are experts at self depreciation. There is far too much of that sort of thing going on. If the prophets of gloom are to be taken seriously we are once again on our last legs, and very rocky ones at that; but the history of our Empire is strewn with similar effusions and lamentations.

* Paper read at the Glasgow Rotary Club Luncheon, May 18, 1926.

Britain has been expiring, or on the point of expiring for centuries. All I can say is that so far as I am concerned, she is the only country worth while, and that I hope—and believe—our successors in the year of Grace 2026, will be saying the same to the croakers of their generation.

What does the United Kingdom Telephone Barometer indicate however? Let us compare 1925 with 1924! The number of telephones in use throughout the country was increased by 114,287, and the number of calls made by subscribers increased by no less than 94 millions.

How do the Glasgow readings run? In this district we increased our telephone stations by 2,604 (the biggest jump for many years) while the number of calls went up by nearly 3 millions.

Statistics relating to 1926 are not yet available in respect of the whole country, but so far as Glasgow is concerned, it is pleasing to report that not only has progress been maintained but up to the end of the first quarter—the latest figures at present available—the advance has accelerated. Our net orders for new telephone stations total 1,169, compared with 654 for the corresponding quarter of 1925, and for the same period our calls are up by no less than 825,915. The extending use of our Trunk and Long Distance lines is indicated by increased takings, amounting for the quarter named to £2,687. This latter is particularly gratifying, and if the growth is maintained, it will eventually justify the confidence of the Post Office in spending so much capital on the provision of underground wires between Glasgow and some of the principal Southern Cities.

Altogether, I cannot but reason that, if these figures mean anything, they indicate that the old country is at least "sitting up and taking nourishment," and that she intends returning to health, wealth and strength despite the Dismal Jimmies. The average Britisher does not install more telephones and make additional use of those he has if the bankruptcy court is looming immediately ahead. So let us smile awhile and keep our heads high in the knowledge and belief that we are in a country that is well worth while and that for our part we are doing—and intend to keep on doing—the things that matter in, to, and for, that country!

There is much to be said for the stolidity and inbred conservatism of the average Britisher, but there can be no doubt, I think, that sustained application of these characteristics—in regard to telephones—will be a definite handicap to the nation, and will certainly retard the attainment of maximum business and professional efficiency. Mutual goodwill is a certain winner in this case again. Give us the opportunity of breaking down our insular prejudice, and the further and accelerated advance of this country, so far as its telephones are concerned, is assured.

Traffic.—Now to figures again. It is estimated that the number of calls made during 1925 by all the subscribers in Great Britain amounted to *1,100,000,000. For each normal weekday this works out at approximately 3½ millions. During the rush hour, which usually occurs between 10 and 11 a.m., we deal with about one-sixth of the day's work. It does not call for much calculation to show that during this hour, and on practically every weekday, about 600,000 subscribers make calls to as many others. Therefore no less than 1,200,000 persons use the telephone on weekdays between 10 and 11 a.m. or 20,000 every minute. As a point of interest I suggest a moment's thought as to what would happen if the service machine failed to function for 10 minutes during this hour. *Per contra*, if by goodwill and co-operation we could save one second at each end on the operation of every call, just think what it would mean to you and to ourselves. Perhaps you would scarcely credit the statement that such a saving would be worth about £32 10s. per second in Post Office operating costs alone. And when we think of the minutes that are wasted—! The business community must also lose, but as the wastage is spread over so many people it is not so apparent; it is, nevertheless, very real.

The call figures as applicable to Glasgow are as follow:—

- Per annum, 52 millions.
- Per normal weekday, 175,000 (182,000 including night traffic).
- From 10 to 11 a.m., 29,000.

During our busy hour, therefore, 58,000 people speak to each other. This works out at about 966 every minute. Just supposing—I only said supposing—something went wrong and we were out of action for 10 minutes, there would be something like 10,000 angry Glaswegians, a great dislocation of business and other routine, and quite a few new words and phrases added to our already extensive and unique telephone vocabulary!

Of the 52 million calls referred to, 45 millions were effected without delay or other untoward circumstance; the other 7 millions were delayed or lost because of the following:—

	Millions.	About %
Required number engaged	5	10
No reply from required number	1½	2.5
Wrong number trouble (given wrongly to operator or subscriber)	½	1
Junctions engaged and miscellaneous troubles	¼	.5
	7,000,000	

It may not be amiss at this point if I say a word in respect of the much abused and often misunderstood routine expressions made use of by our Exchange Operating Staffs.

*Each call means at least two messages.

Use of "Standard Expressions."—The general speeding up demanded by modern conditions, the growth of the service and the increase in calls, have, between them, necessitated the introduction and strict application of what is known as "Standard Expressions." It is now essential that unnecessary words, phrases and expressions with the least liability to phonetic error should be kept to a minimum if not entirely eliminated. The saving of time and the resultant increased efficiency is of benefit equally to the subscriber and the Post Office.

I know these expressions and phrases sometimes strike you as being very wooden, and they may have a tendency to irritate further an already irate caller. I am sure it needs no assurance of mine to make it known that the procedure is not intended that way. A lot, indeed everything, depends on the manner in which the words are spoken and received, and while they may not correspond to one's ideas of what might be said in particular or special cases, they are the expressions least liable to error and best suited to the common good. This is one of the sections of our organisation where the voice with a smile in it smooths out the difficulties of the caller and the operator.

There is one popular impression I would like to correct. Many people think that our operators repeat numbers and phrases differently from the way they receive them for the sheer love of being contumacious. This is one of the great illusions of the telephone public. The operators must adhere to rule if they are to keep the telephone machine running smoothly and efficiently, and when numbers are repeated to you in a different way to that in which you have given them in, the exchange girls are taking the only opportunities available to them of guiding you along the right road.

It is neither my intention nor desire to weary you with arithmetical summaries relating to the varying phases of our organisation, but there are a few salient points I wish to make, more particularly from the viewpoint of what might be achieved by active and mutual goodwill.

Effect of Wastage on "No. Engaged" Calls.—Not long ago I stated that for every hundred calls made by Glasgow subscribers, 85 were at once effective, and that 10 of the remaining 15 were delayed or lost through the required number being engaged.

Ten calls per hundred mean in Glasgow 5 millions per year. The time spent on operating these calls is entirely waste so far as the Post Office is concerned. Each such call is estimated to take up an average of 6 seconds operating time. During the year we therefore spend 30 million seconds on the manipulation of ineffective traffic due solely to engaged number trouble. Reduced to £s.d. this represents an annual loss of operating time equivalent to about £770.

This "10%" engaged figure applies broadly to the whole country, and it means that every year there are no less than 110 million "engaged" calls and 660 million wasted operating seconds. In financial terms this is equivalent to about £17,500.

I am sure you will agree that the last thing we desire is an increase in this type of call. The operators do not like it; it is much more satisfactory to know that a call has been effected, than to feel that effort has been wasted. It means loss of efficiency and increased costs to the department. Time to us is literally money, but if one second is lost on every call, it means about 30,000 per annum in operating costs. A loss of a second on every call in Glasgow alone means a waste approximating to £1,300 per annum.

I leave these figures without comment, except that I feel my plea for goodwill—that eminent saver of time—needs no further urging.

Effect of Wastage on Trunk Circuits.—There is another aspect of wastage, and this will appeal directly and perhaps forcibly to those of my audience who make use of the Trunk lines, particularly the long distance circuits. Most of you will be familiar with the operators' "Time's up" intimation, and I have no doubt that on many occasions it seemed that you had not had your full three or six minutes, or that the Post Office was much too particular and could well allow you a few extra seconds. Will you investigate with me the effect of this on our Glasgow-London service. Let us assume that by reason of negligence either at the Exchange or the subscribers' offices there is an average waste of 30 seconds on each Glasgow-London call. There are 200 of these each* day and with 300 working days in the year it will be seen that the total relative traffic amounts to 60,000 calls. The approximate charge per half minute is 1s. 1d.; therefore the loss of this time on every call would amount to £3,250 per annum. The desirability of insistence on time limits and of maximum efficiency will, I feel, be clear to all concerned, but once again, the tone in which "Your time is up" is said makes all the difference in the world.

Before we leave this particular phase of the service, may I say that in addition to financial loss a wastage of time on trunks means decreased service efficiency and increased delay in getting through to the place required. Reverting to the Glasgow-London Trunks again, a loss of 30 seconds a call is the equivalent of the use of half a line and to that extent, therefore, your calls would be delayed. Similar statistics could be given in regard to other services, but this one illustration will perhaps suffice.

Long Distance Services.—Talking of long distance calls reminds me of the wonderful service now available for our subscribers to all parts of the country; London in ten minutes for instance; Liverpool in five; Edinburgh in one, and so on. Like the Sun, Moon, Stars, Tides and other daily happenings, these things are so much taken for granted that their

*Glasgow controlled traffic to London. The estimated loss is at Glasgow end only.

existence and their bearing on our everyday life is apt to be overlooked; it is only when the wheels do not run so smoothly that we are conscious of what we are missing, and then too often, for so we are built, we anathematise everybody and everything in a vague general sort of way and for ever after agree with the cynic who sees no good in anything.

There is another point, however, with regard to "Trunks" which I feel is not fully appreciated. Between 2 p.m. and 7 p.m. charges on long distance calls are reduced by 25%. To the Glasgow business man who can arrange to make his calls between these hours the saving in costs would be appreciable. Again, between 7 p.m. and 7 a.m. the charges are halved on trunk calls for which the normal fee is 1s. or more. I commend each of these points to your consideration.

I would also make a further suggestion. During the afternoon, say from 1 p.m., some of our long distance circuits are not fully occupied with public work. Would it be worth your while renting a line to another centre for an hour or two for your exclusive use at present tariffs? If you consider this in any way and will get into touch with me, I shall be only too pleased to supply information and help.

Telephone, Telegram and Postal Facilities.—Then again, it does not yet appear to be fully realised that telegrams may be telephoned to and from your place of business or your home; that express messengers can be summoned by telephone; express letters despatched and other most commendable conveniences brought to your service by means of the telephone system. As subscribers realise the benefit of these facilities so their use is growing, but we want to accelerate expansion in this regard, and shall be only too pleased to see you all taking the maximum advantage of the services concerned.

There is a further interesting point about our local service which I feel is not generally known. The area over which Glasgow subscribers can now get calls through "on demand" covers no less than 4,350 square miles. It goes to Rothesay on the West, Tarbert on the North, Berwick on the East, and Ayr to the South. The telephones in this area number nearly 100,000, and telephonists at all our Glasgow Exchanges can, or should, put callers in touch without delay with all subscribers in the area concerned. Calls to places outside this region are, of course, obtained via the Trunk Exchange.

Letters of Complaint.—Last year we received one letter of complaint for every 28,000 calls; this year the ratio—so far—is 1 to over 30,000. I am sure such figures need no further comment.

Need of Expert Attention at Subscribers' Offices.—As a general conclusion let me again urge the vital need of expert attention to your telephone service; we realise the essentialness of this at our end, will you kindly look at the matter from the same angle. To Newton, the apple was the symbol of a great law; to the market gardener it is a commercial affair; to the boy it suggests the idea of a feast; so to the expert the telephone is the embodiment of business efficiency; to the commercial and professional man it is a business proposition; to the average public it is a convenient nuisance. I beg you to take the view of the expert. Put the best of your staff on your office telephone duty; whatever else you do, don't make the telephone work one of the office sidelines; it's not fair to yourself, your clients, or to us. If you would like to do so send your telephone attendant along to our Operating School for help and tuition; this will cost you nothing and will be helpful in many ways. If you feel a Telephone School refresher is not necessary, send your operator—especially if you have a private branch exchange—along to our Exchange, particularly that one to which you are connected, to see the other end of the business and to meet the people who have to handle your calls. Above all, if you are in difficulty of any sort appertaining to the service, let us know about it quickly so that expert attention may be given and future inconvenience eliminated so far as that is possible.

You may say this is stating the Post Office side of the Telephone Service. So it is; that is the intention, but it does not overlook the customer to whom we are selling our goods, which are telephone calls. You are our customers; we are endeavouring to visualise the service from your angle of vision, and in providing our service we are trying to locate those things that make the straightest appeal to you. In short, we are trying to give "Pleasure" as expressed in terms of an ideal telephone service.

Conclusion.—It is impossible to sit still. We neither need nor can we do this. We must take the long view; if we begin looking about our own feet we merely circle round ourselves and never get far from the starting point. Thinking is an indispensable preliminary to efficiency. We are thinking all the time how we can advance our service in efficiency and extent, and if you will help us by thinking also what might be done from your end and then doing it, our progress will be accelerated beyond anything we have ever yet achieved.

There is an old saying amongst telephone folk that "The fool is always at the other end of the wire." This is one of those witticisms that sometimes have a germ of truth in them, but I am appealing to you now to discard the idea that the other fellow is always wrong, and give him credit for as much sense as yourselves. With goodwill this will not be difficult. With goodwill we shall be able, and will appreciate each other at par value, and by realising our mutual aims and ambitions we shall, so far as our telephones are concerned, very soon have a service the standard of which will not be surpassed by any other place or country this side of the millenium!

I ask your attention for the closing minute to the following lines by an unknown author in one of our Glasgow subscribers' offices. The words are

apt, and the spirit summarises in excellent manner the whole purport of this paper. Listen!

A VOICE.

A Voice across the Telephone can make or mar the day,
Be careful of the tone you use, and think of what you say.
Your pleasant smile cannot be seen, or known your kindly heart,
For people on the Telephone are often miles apart.
The girls who answer (Central) have a score of lines to mind;
Mistakes are bound to happen, so be patient and be kind;
For life is like a garden where our daily acts are sown
And, as nature has ordained it, we shall reap what we have sown;
So sow a Smile and reap a Smile, and in the end you'll find
That nothing reaps more victories than the art of being kind.

NOTES ON TELEGRAPH PRACTICE.

BY G. T. ARCHIBALD.

(Continued from page 195.)

XVII.—Concerning the Treatment of Telegrams at the Delivery Stage.

As Mr. John Lee has pointed out in "Telegraph Practice," continental countries are satisfied with the periodical delivery of telegrams, whereas the fundamental principle of the British Administration is that telegrams are urgent communications demanding delivery immediately on receipt. For this reason the arrangements at the addressing stage must be on the same high level as at all other stages in the treatment of telegrams.

To the uninitiated the preparation of telegrams for delivery may seem to be a simple operation, calling for no special ability or knowledge on the part of the telegraphists whose duty it is to handle telegrams at that stage. It is not, however, a mere matter of addressing envelopes or of enclosing the forms in specially-prepared covers. The Post Office is at great pains to deliver every telegram entrusted to it, and everything possible is done to trace the addressee in cases where telegrams are insufficiently addressed. Directories are consulted, puzzling mutilations of registered abbreviated addresses are solved, special instructions must be attended to, reply paid vouchers must be prepared, and portorage and short charges have to be assessed and arrangements made for their collection, &c., &c.

From 1870 until comparatively recent times practically every telegram was delivered by hand from the delivery office nearest to the recipient's address, and as the great bulk of telegrams were fully addressed, the duty of the telegraphist at the received check stage was comparatively straightforward. With the increasing popularity of the registered abbreviated address (there are now 32,000 such addresses in London alone) and the steady growth of telephonic delivery, the received check position has become one of more importance. To be properly equipped for the work a telegraphist should possess a good knowledge of the delivery areas. It is not, however, expected that he should memorise the names of every street, &c., and complete street lists are provided, together with full details of the renters of abbreviated addresses and telephone subscribers who accept delivery by telephone. These particulars have been arranged in various ways, *i.e.* in book form (both bound and loose leaf) card index, and "strip" index, and it has been found that the latter system is the most suitable for use at offices where frequent reference is necessary. At smaller offices a book or card reference usually meets all requirements.

The work of the addressing staff has been greatly simplified of recent years, following the rapid growth of the card index and stencil systems.

Originally telegram covers or envelopes were for the most part addressed by hand; but covers were provided upon which was printed the full name and address of abbreviated addresses in cases where registrants received telegrams regularly. No standard seems to have been laid down for the provision of printed addressed covers until 1890, when it was found that addressed envelopes were being requisitioned for large numbers of registrants who received very few telegrams: in fact it had become the almost universal custom to obtain prepared covers for every abbreviated address with the result that there was considerable wastage of stationery. It was decided that printed addressed covers should only be provided for registrants who receive not fewer than six telegrams a day. The introduction of the system whereby local offices are enabled to address covers by means of stencils, prepared on a typewriter, and which are capable of producing many thousands of copies has largely ousted the specially-printed addressed cover which is now only supplied in cases where a fairly large number of telegrams are received daily by a registrant.

Special and distinctive envelopes are provided for use in connexion with telegrams upon which a charge has to be collected, the amount to be collected being written (in ink) in the space provided for the purpose.

The make up of the envelope has undergone various changes since 1870. In 1875 it was decided to record at the bottom left hand corner of the cover the time at which each cover was sent out for delivery, but this unnecessary additional clerical work was soon abandoned in favour of the arrangement whereby the time at which the messenger commenced delivery was recorded on either the office copy of the "C" form or on a Received Message Slip.

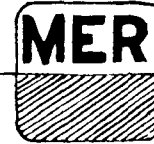
Registered abbreviated addresses created their own special problem, particularly at the larger offices. The addresses have to be translated before the telegrams can be sent out for delivery, and in London, Liverpool, Manchester, Glasgow and many other large towns the question of the most convenient method of supplying addressing clerks with the necessary information has been constantly under consideration. Where the number of addresses exceeded the number which could conveniently be displayed for reference on stout cards, sheets of lined paper containing a number of names were bound together in book form with alternate blank pages for alterations, additions, &c. The system is fairly efficient until, through constant reference, the books became soiled and the alterations and additions became so numerous as to make easy reference impossible. The system has one serious drawback. Addressing clerks not infrequently, and largely as the result of eye trouble, translate the name and address either above or below that appropriate to the registered address under treatment and many troublesome cases of mis-delivery are the result.

The books are costly to prepare and to keep up-to-date, and although the administration was most anxious to find a more satisfactory system it was not until 1914 that the card index system was given a trial. Manchester was then the scene of an experiment which proved so successful that this system of recording the particulars of abbreviated addresses became almost universal so far as the large offices were concerned. The cards and containers were inexpensive, alterations were readily made where necessary, new registrations were added with ease, and the cards relating to cancelled addresses were, of course, removed when no longer required. The consequence was that the rate of disposal of telegrams at the addressing stage was accelerated, and fewer telegrams were mis-delivered, but the system did not overcome the need for addressing covers in the case of telegrams for which printed covers were not supplied. This disadvantage applied equally to the book record, and necessitated the employment of telegraphists on the work of addressing, and the administration naturally turned its attention to the question of finding a system that would enable the preparation

of covers to be undertaken by some cheaper form of labour, leaving the responsibility for the final check in the hands of telegraphists.

Various suggestions were considered, and ultimately what has come to be known as the stencil addressing system was accorded a trial in 1923.

INDEX CARD
(Stencil
File)



Stout Card 4" x 2"
3/4 Enamelled Steel Signal.

FIG. 7.

A stencil card is required for each address, the stencil being cut by means of an ordinary typewriter; a stencil carrier is used to facilitate the feeding of stencils in the typewriter.

There is sufficient space on each stencil for five lines (single space) of lettering, and the particulars are positioned as follows:—

SALTEXTILE,
Salts Textile Co.,
32-33, St. Pauls Churchyard.

If the registered address corresponds with the name of the firm, or of a partner of the firm, the name of the town follows the registration, thus:—

TORRANCE, LONDON,
Miller, Son & Torrance, Ltd.,
21, Cannon Street.

Special instructions are expressed as briefly as is consistent with clearness, and if possible are included in the same stencil card as the address, thus:—

ANALOGY. (* after 6.15 p.m.
Sat. 2.0 p.m.)

Watson & Co.,
40-44, Holborn Viaduct,

* Retain 8.30 a.m. delivery.

Lengthy instructions are prepared on a separate stencil card which is associated with the address stencil. In these cases the particulars are stencilled on the cover thus :—

G.A.G. † after 5 p.m.

Grant Barnett & Co., Ltd.,
30, Wood Street,

Personal delivery until 5 p.m.
(Sat. 1 p.m.)

G.A.G. † 5.8 p.m.

(Sats. 1.2 p.m.) by phone. After 8 p.m. (Sats. 2 p.m.)
and all Sunday, Bank Holidays. Letter Box
31, Wood Street.

who prepares the requisite number of envelopes and places them in the envelope file with the warning envelope in its proper place.

Temporary special instructions are provided for by gumming across the face of the appropriate stencil a slip bearing the instruction "Refer to Temporary Special Instructions" or by replacing the stencil by means of a card bearing a similar instruction in addition to the address particulars.

Periodic checks are made to ascertain whether the basis on which the envelope file is compiled remains unaltered. Should the percentage of telegrams for which prepared envelopes are available fall below the standard a readjustment of the registrations between the envelope file and the stencil file is necessary.

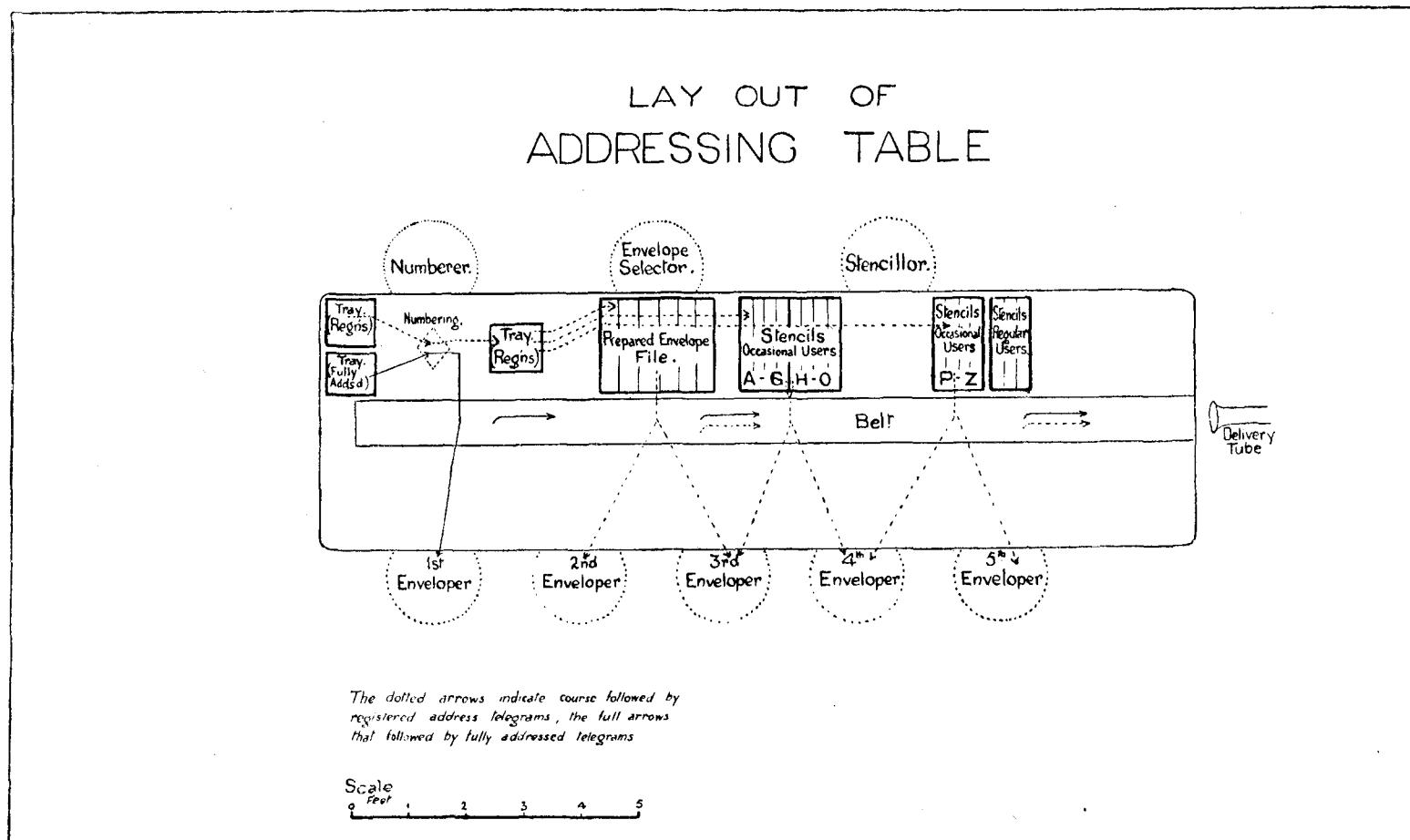


FIG. 8.

The registered name is imprinted in large block letters on the under side of the cardboard frame of the stencil card at the end at which the lines of typed matter begins.

The stencils are stacked in containers on the lines of card index containers and index cards bearing metal signals $\frac{3}{4}$ in. wide inscribed with three or four index letters (Fig. 7), are placed between every tenth and eleventh stencil to facilitate selection.

Fully addressed envelopes are prepared and filed in advance for all registrants who receive on an average one or more telegrams a day. In all other cases envelopes are prepared from the stencils as required.

To ensure the regular renewal of the envelope file the second last envelope in a group is used as an indicator. It bears the instruction "Prepare . . . Envelopes" as well as the address particulars. When this envelope is reached it is passed to the stencillor

Printed covers may continue to be requisitioned for registrants receiving more than six telegrams a day, but the minimum figure may be increased if it is found that stencilled addressed covers can be prepared without adding appreciably to the stencilling cost.

In operation the system is delightfully simple. The addressing table layout is shown in Fig. 8. Telegrams for delivery are sub-divided during sortation at the "Received Check" position into :—

- (a) fully addressed.
- (b) registered addresses.

Both groups are dated, stamped and numbered in one series, usually by means of a combined date stamp and numbering machine. Fully addressed telegrams are passed direct to the envelopes, while registered address telegrams circulate to the envelope file position. The envelope selector associates a prepared cover with

each telegram for which an envelope is available and passes it to the envelopers. Telegrams for which no envelope is available are passed to the stencillor who extracts the appropriate stencil, prints the address on a cover by passing an inked roller over the stencil, and returns the latter to the file. The form is then associated with the envelope and passed to the envelopers.

Telegraphists perform the duties of envelopers and check the envelopes by comparing the registered address with that written on the form: they prepare reply paid forms, &c., and complete the telegrams for transfer to the sending out point. The numbering position and envelope and stencil file position are staffed by Girl Probationers and Boy Messengers.

The system is now in operation at all the large telegraph delivery offices in the country and it is estimated that its introduction has already reduced staff costs by upwards of £10,000 per annum, and further economies will be effected as the use of the system is extended.

Reply paid telegrams, as may be supposed, received special treatment. The special reply paid form now in use was not introduced until 1885. From 1870 until 1877 an ordinary "A" form suitably endorsed and valid for only two days was enclosed with the delivered telegram, and senders of reply paid telegrams were advised to apply for a refund of the amount deposited if no reply was delivered to them within three days. From 1877 until 1885 a voucher to the value of the amount deposited by the sender was attached to an "A" form enclosed with the delivered copy and the period of validity was increased from two days to two months. From 1885 onwards a distinctive reply paid "A" form has been used, the voucher particulars being recorded in ink on the back of the form. With the exception that the voucher particulars have been slightly curtailed the reply paid form now in use is identical with that introduced in 1885.

As a general rule the addressing positions are placed near the main circulation in order to reduce to a minimum the time occupied in the transfer of the traffic. There are, however, a few cases where for convenience—the volume of traffic being small—and in order to economise staff, the telegrams for delivery are enveloped in the delivery room. Of recent years it has become the practice to envelope at the Head Office all telegrams for delivery from certain branch offices served by street tubes. There are solid staffing advantages in concentrating enveloping work in this way, and the arrangement is being extended wherever the circumstances are favourable.

When a telegram for delivery has been enveloped and the received serial number and the envelope's initials have been recorded on the face of the cover it is transferred by means of a tube or other conveyor to the delivery room.

(To be continued.)

THE PASSING OF BANK EXCHANGE (LONDON).

BORN DEC. 1, 1895. DIED JUNE 5, 1926.

THAT is the bare story of Bank's existence, but much has happened in the thirty odd years.

It may very truly be said of Bank that it bore a charmed life. It survived a serious outbreak of fire in February, 1905, when, owing to contact with live conductors during the electrification of the Underground Railway, many of the cables leading in to the Test Room were burnt out. From 1911 onwards its existence has been threatened frequently by the advance of the Central

Battery System, but it is not until we find Automatics on the very threshold in Hendon that Bank makes its graceful and final exit.

It must be recorded that right up to the end Bank refused to expire at the appointed hour, for the General Strike caused an unexpected postponement.



FIG. 1.

Fig. 1 gives those who are not acquainted with the flat type of multiple a good idea of the general appearance of the switch-board.

Other exchanges of this type existed when Bank was opened, but this switchboard incorporated many improvements.

It will be seen from Fig. 2 that there was considerable economy in regard to the space required for the operating staff, for they sat



FIG. 2.

facing each other across the subscribers' multiple field, and this involved one set of telephonists in reading the numbers upside-down.

Fig. 3 is a view of the "B" positions which were built some time after the original flat board.

When Bank closed, service was being given to only 75 subscribers, but when middle-aged, 2,000 subscribers' lines were connected. For some time the calling rate on Bank was the heaviest

of any exchange in the country, and some idea of this can be gained from the fact that about 30 lines per position gave a full load.

A few days before Bank closed it was visited by several people who had taken part in its construction, and quite a number of

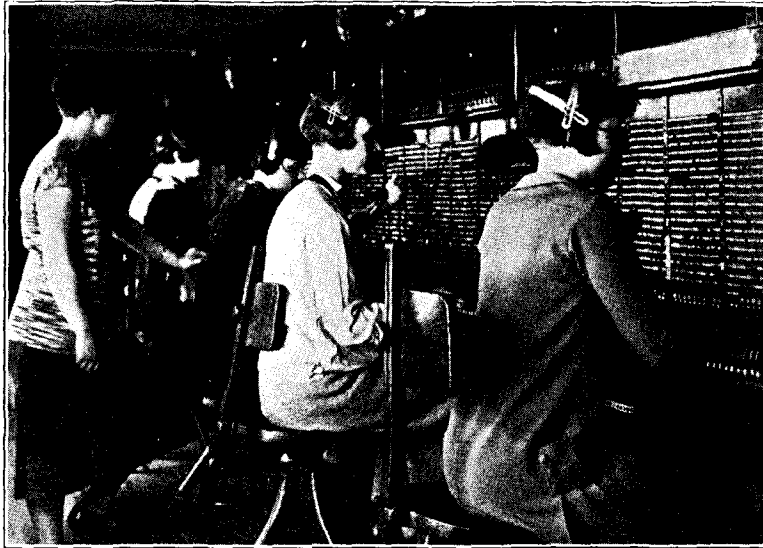


FIG. 3.

“Do you remember” incidents were related. One pleasing feature emerged, and that was that everyone had a real affection for the old place. This can be said of all those who have passed through its portals, and it can be said very literally, that Bank did not pass without tears being shed.

T. A. B.

THE PROVINCIAL TELEPHONE SERVICE AND THE GENERAL STRIKE.

We have already in the last issue of the *Journal* had the story of the part that the London Telephone Service played during the General Strike, and, although somewhat belated, we feel sure that our readers will be interested in a few notes regarding what happened in the Provinces.

The outstanding features were the abnormal increase in traffic, the magnificent way in which the staff handled the traffic and the negligible number of complaints that were received.

The increase in traffic in most districts resolved itself into two peaks, one at the commencement and the other at the end of the strike period with an intermediate depression. The greatest increases were felt in the trunk exchanges where the loads experienced varied from 25%—50% above normal during the peak periods, although reports indicate that in some of the local exchanges the increase was, at times, 75% above normal. In one or two cases it was necessary to extend the hours during which certain provincial trunk exchanges are normally open. Daily reports of the position were furnished to a Central Traffic Office in London, and close touch with Headquarters was maintained throughout the period of the strike.

An interesting feature was the increase in phonogram traffic. Several districts refer to the abnormal use of this service, and it is probable that unavoidable trunk delays accounted for a temporary return to “Telegraphs” on the part of subscribers. One district, however, reports a decrease in phonogram traffic during the strike, and record figures at the termination, due probably to the temporary suspension of flat racing. We wonder if punters saved up for a “grand slam!”

The part played by the exchange staffs is worthy of record. Both the Supervising and Operating Staffs rose to the occasion and gave of their best. Although generally transport difficulties in the provinces did not call for an emergency transport scheme on such a scale as that necessary in London, many tales could be told of the difficulties overcome by the operating staff in their efforts to attend punctually for duty. In these efforts they were admirably assisted by volunteer transport workers. Out of a total of 1,330 attendances, at two exchanges in a large provincial centre, the number of late attendances during the strike period was only 21. Overtime and short meal reliefs were the order of the day, and, in the words of a Traffic Superintendent “. . . the staff performed their duties in exemplary manner which merited every praise and commendation.” A word should also be said with regard to the splendid way in which married ex-telephonists responded to the call for temporary duty at exchanges where overtime was not sufficient to cover the staffing needs.

One incident which exemplifies the spirit of service which was evident during a trying period is recorded as follows: Two telephonists (an observation officer and an exchange clerk) had occasion to make a call from an outlying call office one evening. The night telephonist on duty at the exchange informed them that he was exceptionally busy, whereupon they volunteered to give assistance, and remained at the exchange until things slackened down. We think that in this case the operating charges on the call should be deducted from the fees chargeable to the callers!

A pleasing feature of the service during the strike was the almost entire absence of complaints. In this connexion it is interesting to note that the number of written complaints received from subscribers has been steadily decreasing during the last year or two, and if we were able to balance letters of commendation received during the strike against the letters of complaint received during May, the Provincial complaints curve would look very depressed.

We hesitate to adopt the patent medicine style of advertisement in a respectable service journal, but we feel that one or two tributes to the efficiency of the telephone service, extracted from letters received from Civil Commissioners, railway officials and the general public, should be recorded in view of the *other sort of letter* we sometimes receive. Here are a few typical extracts:—

“. . . . It is a unanimous feeling in the whole of the office that but for the way in which the telephone connexions were served through the national telephone, our work would have been much more arduous and almost impossible to carry through. . . .” (A Railway Divisional Operating Superintendent).

“. . . . they (the staff) showed no sign of becoming ‘rattled’ or impatient. . . .” (Brigadier-General)

“. . . . I am directed by Major-General to express his thanks for the very efficient service at the exchange. . . .”

“. . . . the telephone service and the courtesy of the operators has so improved in the last two years that *there is little need of comment on it*, but I do feel that you should know of the really exceptional courtesy and help I received last evening. . . .” (The italics are ours).

Another phase of telephone activity during the emergency was the provision of a large number of temporary circuits to meet the needs of the emergency services. From one or two reports we have read in this connexion, we are sure that our friends on the Engineering side (that body of strong silent men) could unfold a very interesting story of the work they performed.

In a service journal, under the heading of a “Critic Converted,” we recently read, with gratification, of how a leading newspaper made an *amende honorable* to a certain department with regard to its efficiency, as a result of observation of the work carried out by that department during the strike. We trust that the work carried out by the Post Office Telephone Service during the late emergency will similarly convert some of our critics.

So ends a brief account of how the Provinces “carried on” during the General Strike.

TELEGRAPHIC MEMORABILIA.

AUSTRALIA.—The following description of the Ballan "Beam" station is from Reuter's Melbourne Agency: "About halfway between Ingliston and Ballan, a few miles south of the Ballarat railway line, are the six steel towers of the Australian "beam" wireless-telegraph transmitting station. The main building at the station itself has been almost completed, and the tests will probably be carried out before August. A very short wavelength, probably less than 40 metres, will be used at the Ballan station, the cost of which is likely to be less than one-third of the cost of a long-wave station; six masts, each 250 ft. in height, are required, and it is expected that the power to be used by the transmitters will be about 25 kilowatts. The site at Ballan is about 1,800 ft. above sea level, and is free from "shielding" hills. The masts stand on a plateau slightly elevated above the surrounding country. The station will consist of two separate transmitters, one for communication direct with England and one for working with Canada. Two aerial systems will be needed, each supported by three masts, and the angle of the beam will be about 45 degrees. In the morning the aerial pointing to the north-west will be in use, when the beam path to England will then be for the greater part of its length in darkness; in the evening, however, the beam will be sent in a south-easterly direction, going round the other half of the earth, which will then be in darkness. The Canadian aerial will transmit in a north-easterly direction only. All the electricity for working the transmitters as well as for domestic purposes in the cottages of the station staff will be generated at the station. Each engine and generator is set in a block of concrete which rests on a bed of compressed cork to prevent vibration being communicated to the transmitting apparatus; the concrete blocks on which the transmitters will be built will also be set on beds of cork. Messages will be transmitted from the offices of Amalgamated Wireless (Australasia), Ltd., by whom the station is owned, in Melbourne at a speed of 100 words a minute by means of a telegraph line to Ballan."

It is also reported, from the same source, that the Commonwealth Government is likely to take over the whole of the broadcasting operations in Australia shortly.

Hobart is to have a new broadcasting station capable of transmitting throughout the Commonwealth. The existing station (7ZL) has been taken over by the Tasmanian Broadcasters Pty., Ltd. (a company registered in Hobart last February), and will be moved to larger quarters ready for operation by July.

The Electrical Review informs us that so soon as the route of the new road from Sydney to Newcastle is decided, the Post Office authorities are to lay a telegraph cable between those two towns, which will provide for at least 100 direct lines between the two cities. That scheme will cost £250,000. Meanwhile valve amplifiers on the line between Sydney and Melbourne are to be used to give some relief on the Sydney-Newcastle lines. By this system one line can be used for ten messages simultaneously.

BELGIUM.—The Commercial Secretary of the British Embassy at Brussels reports as follows on the Belgian Telegraph and Telephone developments:—

During 1925 a new line, 40 km. in length, was set up between Keppen and Asch, while additional wires totalling 112 km. were placed on 13 existing lines. On Oct. 31, 1925, the total length of the lines forming the telegraph system was 42,370 km. The contract for the equipment and laying of the La Panne-Ostend-Brussels-Herbsthah international cable was given in December last, and credits for 14 million francs have been assigned for this work in 1926. The total cost is estimated at 70 million francs.

With regard to telephones, three automatic exchanges are now in operation in Brussels and the conversion of two other exchanges is to be undertaken this year, and the remainder will be converted within the next two or three years. In the 1926 budget 124.5 million francs has been set aside for the improvement and extension of the telephone system. During the current year it is proposed to replace many overhead wires by underground cables in several districts. The total length of line on October 31 last, was 870,370 km., as compared with 786,249 km. in 1924. In the international service a number of new lines were put into commission in 1925. The lines under construction are Antwerp-Strasbourg (one line), Brussels-Nancy (two lines), Brussels-Paris (three lines), and Brussels-Rotterdam (one line).

Work on the inter-Continental radio station at Ruysleede has made good progress; the necessary buildings have been completed and are being equipped. Three high-frequency groups and three continuous current groups have been installed, and work on them is almost completed. The station is expected to be opened for service in the autumn of this year.

BOLIVIA.—Reuter's Trade Service at La Paz says that the recently organised Radio Club of La Paz has met with much success. According to the terms of its charter, the members will be asked to pay a small initial sum fixed by the directors, collectively sufficient to cover the original cost of the transmitting station. Within a few weeks broadcasting will commence.

CANADA.—All the broadcasting stations in Canada have recently amalgamated under the name of the Canadian Association of Broadcasters. By means of general co-operation and relaying it is hoped to improve the general standard of the programmes.

COLOMBIA.—*Commerce Reports* states that a broadcasting station with a range of 800 kilometres, and a wavelength of 275 metres is planned in Colombia. Bids, it is said, have been called for the erection of the station.

COSTA RICA.—Reuter's agent at San José reports that the new wireless station belonging to the International Radiograph Co., which has just been erected halfway between Cartago and Paraiso high above sea level, has three steel towers 440 ft. high on cement foundations and 1,050 ft. apart; the receiving station has two towers 140 ft. high standing 183 ft. apart. There is a separate electric plant, a residence for the employees, insulated oil storage, and very full general equipment. Messages are received from the United States, Europe, South America, other parts of the world, and ships at sea.

CUBA.—Cuba, says *The Electrical Review*, will shortly possess another radio-telegraph and telephone station, permission having been given by the Government for the construction of the buildings. The station will be sufficiently powerful to communicate with stations belonging to the United Fruit Co. Communication will also be possible with North, South, and Central America and the West Indies; the contract calls for the station being opened in any case by the end of 1930.

DANZIG.—A new radio station is being built by the Deutsche Telefunken Gesellschaft at Glettkau, in the Free City of Danzig, for the Danzig Government. It is expected to furnish communication with the rest of Europe.

EAST INDIES (DUTCH).—According to a statement published in the *Algemeen Indisch Dagblad*, Jan. 22, 1926, no new permits for radio-telegraph stations will be granted to individuals or private companies in the Netherlands East Indies, while existing or future permits to broadcast by radio-telephony are subject to cancellation. There is no provision for any monopoly, either broadcasting or merchandising, but the Government may, obviously, create a monopoly of the former. The stations licensed must be capable of reaching all parts of the archipelago; private broadcasters may not interfere with Government stations, and available Government stations may be used for broadcasting upon terms to be arranged.

EGYPT.—It is understood that General Manifold, acting on behalf of Marconi's Wireless Telegraph Co., Ltd., has secured a 30 years' concession from the Egyptian Government to conduct a radio-telegraph service in Egypt.

GERMANY.—A new cable-laying steamer was recently launched by the Blohm & Voss Co., of Hamburg, for the North German Sea Cable Works, of Nordenheim, Germany. The vessel, which is 459 ft. in length, has been designed for use both as a cable-laying and freight-carrying steamer, it having a displacement of 14,550 tons and a cable-carrying capacity of 8,000 tons. It is being used for the laying of the final portion of the new telephone cable between Holland and England, and when this is completed it will lay a new telegraph cable between Emden and the Azores.

Commerce Reports states that recent changes in the radio regulations cancel the requirements that apparatus be tested and marked by the Federal post office, and manufacturers are no longer required to submit a sample of every series of receivers built; listeners are no longer required to be members of an approved radio club. A reduction in the amount of manufacturers' licence fees has also been made.

HAITI.—From Reuter, Port au Prince, we learn that the Government of Haiti has granted permission and the necessary funds for the construction of a new radio-telegraph station at some point not yet chosen.

HOLLAND.—It is understood by the *Electrical Review* that the transmitting station at The Hague was to be brought into operation again last month. At such times as Hilversum is not transmitting, PCGG will broadcast on a wavelength of 1,500 metres, and attempts are to be made to reach the Dutch East Indies on a 130-m. wave.

HONDURAS.—Reuter's Trade Service (Tegucigalpa) announces that the Tropical Radio-Telegraph Co., of Honduras, have recently introduced a service of week-end wireless letters between Tegucigalpa and the United States and Canada. The rate per word is 0.15 peso (gold), with a minimum of 20 words. Wireless letters are accepted at the main office up to midnight on Saturday and delivered at their destination on the following Monday morning. The minimum price is 3 pesos, and the language employed must be either that of the country of origin (Spanish) or destination. Code telegrams are not accepted.

INDIA.—We hear repeated reports of the companies that are being floated in India for the exploitation of broadcasting, and could wish that the items received were not so confusing, as already there would appear to be sufficient schemes in the air or on paper to satisfy more than the immediate needs of this vast country. However, the *Daily Mail* quite recently made the following announcement which appears to be able to authorise an approximate date of the commencement of transmission. The London daily in question says: "Prominent Bombay business men have floated the Indian Broadcasting Co., Ltd., with a capital of £112,500 in 10-rupee shares, of which only 60,000 shares will be issued at present. The company will build stations at Calcutta and Bombay, which, it is anticipated, will be ready to transmit programmes next December."

IRISH FREE STATE.—In Dail Eireann, during the consideration of the Budget resolutions Major Bryan Cooper tried to have the tax on wireless apparatus reduced from 33½ to 5%, because the high duty was calculated to check the progress of a new industry. Mr. J. J. Walsh, Minister for Posts and Telegraphs, defended the imposition of the 33½% tax as being one means of bringing crystal sets within the reach of everyone. It was

calculated that the revenue from licences would amount to £20,000, and, with the revenue from the tax on imported sets, he believed that he would later on be justified in asking for the necessary funds to equip three extra wireless stations in the Free State with a power equivalent to that of the Dublin station. The proposed new stations would in due time bring everyone in the country within crystal radius.

JAPAN.—According to *Eastern Engineering*, work has commenced on a site in Otemae, where the Osaka Radio Broadcasting Bureau is to build its main station. The site covers 754 tsubo and the term is for 20 years. At an estimated expenditure of ¥.690,000, the Bureau plans to build a three-storied ferro-concrete structure with three radio rooms, the first intended for foreign music, the second for Japanese music, and the third for lectures, with a battery room on the first floor of the main structure, so as to make broadcasting possible even in case of the failure of the ordinary supply of electricity. The height of the antenna will be 250 ft. It is planned to complete the construction before the end of the year.

Amalgamation.—Now that the novelty of wireless is said to be wearing off, there seems little to broadcast, and the gramophone being more popular, the Government is reported to be attempting to amalgamate the Tokio, Nagaya, and Osaka stations.

JUGO-SLAVIA.—Consular reports dealing with the Zagreb Spring Fair, say that for the first time there was a complete radio exhibit, and great interest was shown in this section in view of the projected erection of a broadcasting station in the district. The best display was from England; others, in order of their importance, were from France, Switzerland, Italy, Austria and Germany.

LONDON.—Mr. Harry Day, M.P., has received from the Foreign Office a reply to a question he raised about delay in granting licences for receiving sets to British subjects resident in France. The British Ambassador at Paris has been informed by the French Government that it is only in very exceptional cases that licences have been refused. Although the French reply does not give any reasons for the delay in the grant of licences, Lord Crewe has since heard that several British subjects, resident at Le Havre, who had hitherto been unable to obtain their licences, have now all received them.

Lord Wolmer recently stated in the House of Commons that the revenue from Press telegrams last year was £84,000, and the expenditure amounted to £330,000.

The British Government has taken over the two Anglo-Norwegian cables from the Great Northern Telegraph Co., Ltd. These cables are now worked direct from London to Oslo and Bergen respectively. There is also a wireless emergency service available between the British and Norwegian capitals. The transfer to the Government took place at midnight on May 19.

MEXICO.—From duly authenticated official reports we learn that the installation of the new 500-watt equipment was completed at the radio station in Chapultepec Park, Mexico City, five or six weeks ago, and will greatly increase the efficiency of communication. The new station will use reduced size antennae of about 45 ft. in height. The old towers at this station are being dismantled, recut to size, and sent to various parts of Mexico for similar stations. At the Chapultepec Radio Laboratories work is progressing on a transmitter, similar to the one described above, which is destined for the city of Campeche.

MOROCCO.—A small wireless telegraph receiving and transmitting installation, says an electrical journal, has recently been carried out at the offices of the Spanish Consulate in Tangier to afford communication with the wireless service in Africa and with Madrid. The power of the plant is only $\frac{1}{4}$ k.w., but satisfaction is expressed at the fact that it is the first all-Spanish plant to be installed.

PANAMA.—A broadcasting station was recently inaugurated at Balboa in the Panama Canal zone, and has resulted in a demand for crystal receiving sets.

PORTUGAL.—The Government has been authorised definitely to ratify the provisional contract with the (Italian) Italcabo Company for laying cables between the Azores and Cape Verde, between Italy and the Azores, and between Lisbon and Malaga.

SALVADOR.—*The Electrical Review* announces as follows: "The President of the Republic of Salvador has issued a decree setting forth new radio regulations; it abrogates one of May 1, 1923, which had heretofore been the basis of radio control. Some of the principal provisions of the new regulations are that broadcasting shall be a Government monopoly, and that owners and managers of places of public entertainment may be required to permit the broadcasting of their performances. Foreigners will be permitted to operate receiving sets, only when they renounce the right to present claims through diplomatic channels. An initial charge of 5 colones is made for receiving licences, and in addition thereto a monthly payment of 3 colones is required. The Government will install receiving sets for 30 colones; sets capable of regeneration are prohibited."

SOUTH AFRICA.—The Durban press announce that the Town Council has introduced a scheme, on the combined recommendation of the borough electrical engineer and the town treasurer, for the payment of broadcast licence fees in monthly instalments along with the electric light account, at the rate (for the present fee of £2 5s.) of three shillings per month for ten months, the first payment of fifteen shillings being made to the Post Office as under the existing instalment scheme. The next step to be aimed at would appear to be an extension of the system to country listeners not connected to the municipal electricity mains, whose initial outlay for their receiving

sets is already so much greater than that of listeners within crystal set range. The zone system of graduated licence fees (already in force in Australia) may be introduced in connexion with the enlarged powers conferred on the Post Office authorities under the new regulations.

SWEDEN.—The Swedish Telegraph Board has concluded a contract with Marconi's Wireless Telegraph Co., Ltd., regarding the delivery of transmitting apparatus for Sweden's first broadcast station. The equipment, according to the *Financial Times*, will be similar to that at the English station at Daventry.

TURKEY.—British official reports from Pera state that a French company is negotiating for land at Yeni-Bagtehe, below Stamboul, on which to erect a broadcasting station. Programmes from European stations will be relayed.

U.S.A.—Reuter's Washington Trade Service reports that the Senate Interstate Commerce Committee has approved the Dill Radio Bill providing for a commission to have control of air communication. The Commission would have supreme power in its field, the Committee having eliminated a provision for appeals to the courts to compel the issuing of broadcasting licences, or prevent the rescinding of them. The Bill's supporters hope to get it passed this session, holding that recent court decisions have made immediate legislation imperative.

The Electrical World writes as follows: "A recent occurrence in Nebraska indicates the drastic extreme to which some city councils are likely to go in attempting to prevent radio interference, when complaint is made by even a few irritated listeners. Just three such persons, alleging that their trouble was due to the Central Power Company's transmission lines, were able to convince the Mayor of Grand Island and the City Council that an ordinance should be passed compelling the Company to remove all of its 33,000-volt lines from the city within 90 days. Because of the enlightenment of the City Council by a broadcast listeners' league it is, however, expected that the ordinance will be repealed."

The following are interesting items relating to private interests in telegraphy in the British Isles:—

The terms of the agreement with the Postmaster-General for a licence for the conduct of telegraph services between Great Britain and foreign countries provide that the Marconi's Wireless Telegraph Co., Ltd., shall continue under British control. Not more than 25% of the issued share capital of the company may at any one time be in foreign hands, and under the agreement the words "United Kingdom or India or any British Dominion, Colony or Dependency" cover the Irish Free State. It will be necessary in future for special forms of transfer to be used in order that a proper allocation of shareholdings can be made.

Following on this, at an extraordinary general meeting on May 31, an extraordinary resolution for the alteration of the articles of association to provide that the British character of the company should be maintained was carried unanimously. Subject to the confirmation of the resolution as a special resolution at a further extraordinary meeting, special forms of transfer, which will be supplied to the Stock Exchanges, will be necessary on and after June 16 for the transfer of shares in the company.

The directors' report for 1925 regarding the Great Northern Telegraph Co., Ltd., of Denmark, shows that the net revenue decreased from £367,704 to £253,267. The addition of the balance brought forward makes £566,938 available for distribution. The total distribution for the year is 20%, as compared with 22% in 1924. The reserve and renewal fund receives £19,444, bringing it up to £3,656,759, and £244,438 is carried forward. The lower revenue is attributed to the general commercial depression in Europe as well as to competition; Government-owned radio stations are particularly mentioned in the latter aspect.

Nevertheless wire and cable telegraphy does not appear to be quite a bankrupt affair! Let the following report of the Eastern Telegraph Co., Ltd. speak for itself:

The revenue for the year ended December 31 last was £3,473,047, and after deducting expenses there remains a balance of £1,321,125. After providing for taxation, preference stock dividends, debenture interest, &c., and adding £511,317 brought forward, there is an available surplus of £1,555,716, as compared with £1,461,317 for 1924. The directors have placed £500,000 to general reserve and have applied a similar amount from that fund to reduce the expenditure on new cables, renewals, &c. A final dividend of 2½% free of tax, has been paid (making 10%, tax-free, for the year), and a balance of £555,716 is carried forward.

Captain P. P. Eckersley is always interesting, and he was never more so than when speaking at the annual meeting of the British Science Guild in London, when he contrasted the system of joint ownership and management as applied by the B.B.C., with private enterprise in America. By amalgamation, he said, the B.B.C. had been able to build up a reputation greater than that of any other broadcasting concern in the world. More people listened to wireless programmes in this country, in relation to the population, than in any other country in the world, and more of the poor people were able to listen; in fact, the B.B.C. fulfilled a public service, and 90% of the people of the British Isles could listen to programmes on a set which need not cost more than two or three pounds. In America, however, those who found broadcasting of the greatest value (*i.e.*, those living in rural areas) had to rely on expensive sets, because it was only in the cities and towns, where the broadcasting companies were able to broadcast advertisements and so obtain revenue, that real service was given. In Great Britain the stations were erected primarily for the public, but in America the man who erected

a broadcasting station did so, in the first place, in his own interests (in order to advertise goods) and afterwards for the public. The B.B.C. was not a trust, but a public service. He did not see why, because the principle of trade directorship of the organisation was to be discontinued and seven men who were absolutely independent of the Press, the trade, or any commercial enterprise, were to be appointed to the board, it should be said that broadcasting would be subject to Government control. If the report of the Broadcasting Committee were adopted by the Government, the B.B.C. would continue its activities in the same way as it had done hitherto. Unified control, and the application of scientific methods, had enabled the B.B.C. not only to serve all the country, but to put into operation methods which competitive organisations would never have been able to apply. For example, any great man's speech could be broadcast to every part of the British Isles, but that could not be done under the American system, because of disagreement between competitive organisations.

From all sides and all sources we are promised all sorts of results from the Rugby station. Fortunately the public are not treated to a sight of all these prophecies and prognostications, varying from ultimate failure on the one hand to threepenny phone calls between New York and London on the other. The possibilities of the following, authenticated by the *T. & T. Age*, appears as within the range of practicability, and would certainly give that degree of secrecy so much desired by would-be users of international wireless telephony when such becomes an everyday public service. The *Age* says, that it is understood that interesting transatlantic radio-telephony tests are to be carried out at the Rugby station. Speech is to be transmitted in an extremely distorted form, in which state it will be completely unintelligible to the ordinary listener. The receiving apparatus in America will filter out the distortion and restore the speech to its original clarity. The filtering device is too costly and complicated to allow of its general use for interception of the messages. Reception could be made still further difficult for unauthorised persons by rapidly varying the distortion, say several times per second, in order to compel the use of perfect synchronisation which is not too easy.

The possibilities of wireless have recently been evidenced in a new direction. In Holland, according to Reuter's Hague agency, the Workers' Wireless Association, which hires the national wireless station one evening each week in order to conduct its own propaganda, seized the opportunity a week or two ago of broadcasting in English, French, and German reports received from the International Transport Workers, the International Federation of Trade Unions, &c., on the situation in Great Britain.

Across the Atlantic the weekly bulletin of the International Federation of Trade Unions contains the following:—The Chicago Federation of Labour has obtained permission from the City Council to erect a broadcasting station and aerial at the municipal pier, which was formerly used as a wireless station by the American Navy. The Labour movement will finance and control the station, which is intended to counteract the anti-Labour propaganda of the local newspapers and also to transmit messages to Labour centres in the United States of America and abroad. The local Typographical Union has voted 10,000 dollars for the station, and the Chicago Federation of Labour suggests that local unions raise a levy of two dollars per member; one-half of the sum so collected to be used to purchase and erect the station and the other half to endow its permanent maintenance.

Unfavourable weather delayed the landing of the English shore-end of the Western Union Telegraph Co.'s new "permalloy" cable from Bay Roberts, Newfoundland, to Seimen Cove, Cornwall, for some time, but the shore-end, about six miles in length, was finally landed from the steamer *Clyde Firth* on May 27. The ocean span will be carried across to Newfoundland by the *c.s. Colonia* this month; returning to England the ship will load the final section of the cable, which will be laid from Newfoundland to New York. The new "permalloy" loaded cable, capable of transmitting 2,500 letters per minute, is the first of its kind to be landed in this country.

Replying to an inquiry in the *Overseas Daily Mail* for news of survivors of the voyage of the *s.s. Great Eastern* when she was engaged in laying the Atlantic Cable, in 1866, Mr. William Cuning, of St. Albans, New Zealand, wrote to the *London Daily Mail* stating that he was employed as an extra engineer, attached to the staff of the screw department. "The engineering staff of the ship, both for paddle and screw, were under the supervision of Mr. Beckwith as chief. The scientific staff included Captain James Anderson, Professor Thomson (afterwards Lord Kelvin), Daniel Gooch, Cyrus Field, Glass, and others, afterwards knighted for eminent services. I regret that I at 86 am very nearly the last survivor of an expedition which aroused the deepest interest in the mechanical world."

It is when reading one's history book or the biographies of outstanding political, naval or military celebrities of the long ago that one realises how far back are the days of the *Great Eastern*. Looking over some of my old scraps recently the writer came across a woodcut in the *Illustrated London News* which depicted the transmitting of the first telegraph message from London (Cornhill) to Paris. Turning over the page to read the further news of the day I found several columns descriptive of the funeral of the Duke of Wellington! Now, dear readers, here is a question in General Knowledge, see if you can answer the same correctly without reference to the Book of Dates! What was the year in which these two historic events happened?

The *South African Postal and Telegraph Herald*, the organ of the Postal and Telegraph Association of South Africa, in its May issue makes the following interesting remarks on the retirement of Mr. Sturman, who, starting as a learner in the Central Telegraph Office 47 years ago transferred as a telegraphist after a few years' service with the Home Government to that of South Africa, eventually rising to the highest post in the latter service, that of Postmaster-General.

According to the *S.A.P. & T. Herald*, Mr. Sturman, in 1919, as President of a joint conference of Staff and Official representatives, conveyed to the then Minister of Posts and the then P.M.G. the unanimous findings of that conference which was in effect to recommend the Whitley principle, only then recently applied in Great Britain.

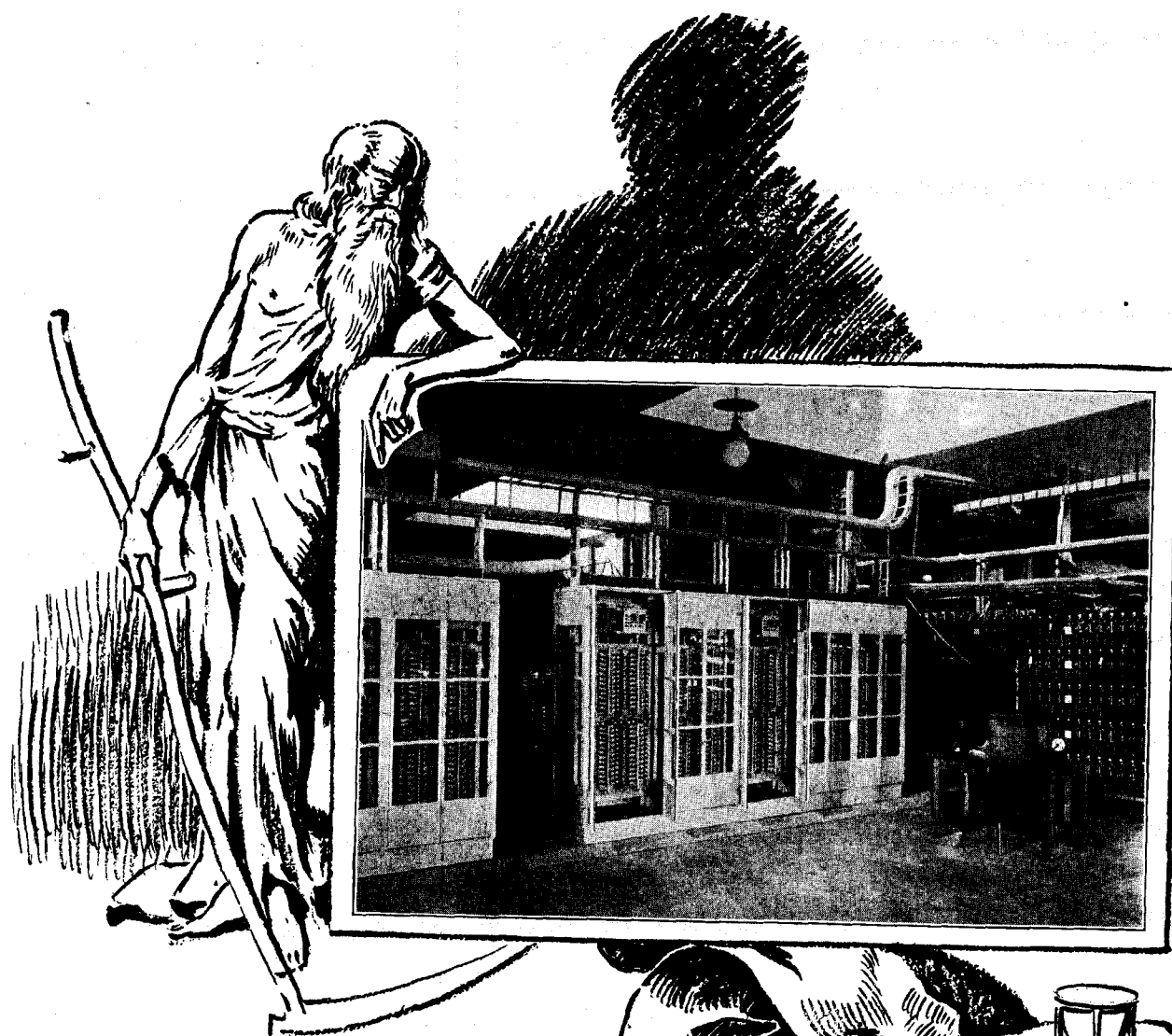
This recommendation was apparently viewed with disfavour by the Administration and matters reached an impasse for several days. Still Mr. Sturman held his ground and defended the recommendations which he, as president of the committee, had been unanimously requested to put forward as a practical proposition. "This," relates the *Herald*, "he did, knowing that the highest post to which he could aspire was shortly becoming vacant and neither the responsible Minister nor the permanent Head approved of his attitude. . . . The stand he took was a credit to his courage and his principle." The Home Service is also proud of so worthy a representative of the Old Country, and it would also wish to pay tribute to the South African Minister and the Administrative Head who, despite the fact that they were defeated by the persistency of their subordinate, nevertheless made no attempt to penalise that subordinate by an act of pettiness to which men of a lower moral fibre would have undoubtedly yielded.

"As P.M.G.," continues the Association's organ, "Mr. Sturman showed the same liberal outlook, though the financial depression which coincided with most of his reign was not a favourable setting. The recognition of the S.A.P.O. Associations developed and strengthened and the P.O. Departmental Committee came into being,—not quite as the associations and the P.M.G. desired, but yet the most effective instrument of its kind which the Union Public Service has known." The Departmental Committee of the South African Post Office service, it should be said, is the nearest equivalent to our own native-born Whitley Committee system.

Messrs. R. L. Smith-Rose, Ph.D., M.Sc., A.M.I.E.E., and R. H. Barfield, M.Sc., Student I.E.E., read a paper before the Wireless Section of the Institution of Electrical Engineers, on "The Cause and Elimination of Night Errors in Radio Direction-finding," a month or two ago, and *The Electrical Review* excerpts and epitomises some of the most important and interesting features as follows:—"The object of a large proportion of the investigations carried out by the authors for the Radio Research Board during the past few years has been to ascertain definitely the cause of the apparent variations in bearings experienced on closed-coil d.f. apparatus during the "night" periods. Some of the investigations have led to the development of methods of distinguishing between the electric and magnetic components of wireless waves, and of the separate measurements of their intensity and direction. This portion of the work has recently led to a definite proof of the existence of downcoming waves at the earth's surface with components of suitable polarisation and sufficient intensity to account for a large proportion of the night errors experienced. In this manner the theory originally advanced by Mr. T. L. Eckersley in 1921 to account for the apparent variations in the direction of arrival of wireless waves has been adequately confirmed; and it is now evident that these variations are caused by the action of the horizontal components of electric force in the downcoming waves on the horizontal parts of the direction-finding loops. It is generally assumed that the downcoming waves have travelled *via* the upper regions of the earth's atmosphere without deviating laterally from the great circle plane through the transmitter and receiver, an assumption that has, however, not been sufficiently well justified in the past; the presence of the downcoming waves has hitherto made it difficult to prove whether the direct waves travelling along the earth's surface have not also suffered lateral deviation. Another portion of the authors' investigations has therefore been made to ascertain to what extent, if any, such lateral deviation exists. The problem is one of more than pure scientific interest; for it is evident that, if directional receiving apparatus can be devised which shows the absence of lateral deviation, a direction-finder can at once be provided which is free from the variable night errors that place such a serious limitation on closed-coil direction-finders. The present paper describes the experiments which have been carried out with these objects during the past 18 months. In the course of the experiments the Adcock "four-aerial" direction-finder has been developed, and with its aid it has been shown that the actual deviation in azimuth of wireless waves is practically negligible. These experiments thus constitute a proof that the variable errors observed on closed-coil direction-finders at night are caused by downcoming waves arriving from the upper atmosphere and polarised with the electric force on a horizontal plane. The investigation also indicates the possibility of the Adcock system being developed into a practical direction-finder which is free from night errors, and those errors associated with observations on aircraft transmissions made at a ground direction-finding station.

The *Scotsman* newspaper in an article written just after the strike makes a great point of how well the news was dealt with by that paper during that period of stress by means of Murray Multiplex telegraph apparatus. Knowing what we know of this excellent modification and development of an older system of its type we should have been indeed astonished had the result proved otherwise. The *Scotsman* might have added, "thanks to the splendid stability of the British Post Office wires, communication was maintained without a hitch," but we can find no trace of any such tribute.

Echoes of Wireless.—"I see our world as a huge room, nothing but a room even if to the human mind a huge one. A signal from a 'Beam' station goes round the earth and comes back again and echoes eight times so that we are in a room and the echoes of its walls disturb us."—CAPT. RANGER.



In the above illustration, the equipment shown to the right and that in the background was installed in 1906 and 1907. The equipment shown in the foreground was installed in 1922, almost twenty years later. The two types are interconnected and are working satisfactorily side by side.

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NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

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THE TELEPHONE AS FRIEND.

IN an American journal, a woman invalid, writing on her "Recipe for Happiness" during nineteen years' life in a wheelchair, says: "If I have need of friends, there's the telephone—blessed instrument, messenger of the lonely, watchdog of the helpless." The phrase is so eloquent of all the telephone may mean to those unhappily imprisoned by ill-health that we can add nothing to its poignancy. It makes the off-repeated charges about the importunacy and intrusiveness of the telephone in private houses sound, somehow, so hollow.

There are two schools of thought as to the need for universality in the telephone—as also in education. One holds the telephone to be a necessity; the other a luxury. To the average man the value of the telephone—as of education—is unarguable. He recognises it, but does not always act up to his belief. He accepts the benefits of the telephone with indifference, and protests but languidly when he sees the furtherance of education threatened by what the poverty of language calls economy. He relishes gibes at the shortcomings of the one, and the semi-literate products of the other. The day-in-and-day-out reliability of the telephone is often forgotten in that unhappy moment when it fails. Its friendly offices and patient loyalties go for nothing—until its indispensable aid is required again.

For it is not only to the sick, the lonely, and the helpless that the telephone is an ever-present friend. To the busy and the idle, the active and the lazy, the sportsman and the recluse, the seeker for pleasure and the seeker for quiet, it is alike of service. It will not only conduct your business, arrange for your pleasures, greet your friends, and ward off the visits of the unwanted; but it will also deal with emergencies and unforeseen contingencies with an effectiveness that need not be enlarged upon to telephone men or even to seasoned telephone users. Those who affect to regard the telephone as a storehouse of wrong numbers, a vain device of frustration and impish and premature severing of important talks, are the very amateurs and triflers of the telephone. The regular user knows better. The Englishman gives his admiration grudgingly, and tempers his enthusiasm with humorous qualifications. He is slow in introducing the telephone to his home, but having done so he will never do without it again. He does not invoke solemn blessings if, when it saves pounds, or catastrophes, or lives, but he appreciates it sincerely though undemonstratively. To this the rapid development of private house telephones in this country bears indisputable witness. "Eupompus gave splendour to art by numbers," says Mr. Aldous Huxley, quoting some ancient author; and in an interesting phantasy tries to imagine how Eupompus did so. When we consider what significance, what comedy, what tragedy even, may lurk behind the number announced in a telephone call, we may reverse the dictum, and say: "The telephone gives splendour to numbers by art."

HIC ET UBIQUE.

THE Public Service Commission, says *Telephony*, has authorised an increase of approximately \$2,000,000 on the New York rates, in addition to the 10% surcharge on the rates now being collected by the Company under an order of the Federal Statutory Court. This increase will apply to New York City only and not to the State as a whole.

The Company is directed to file new schedules for rates by June 10 and these rates will not become effective until approved by the commission. The Company will accept the increase and file the new tariffs under protest.

The German Post Office, like our own and other telephone administrations, has its difficulties arising from similarity of numbers when transmitted through the telephone. We observe from their long-distance instructions that the number 4322 is to be repeated thus: "Drreiundfieärrzich, zwoundzwanzich: fieärr, drrei, zwoh, zwoh." *Zwo* is a somewhat archaic form of *zwei*, and the whole is much as if we should say "Foertythree, twentytway: Foerr, threer, tway, tway."

Information given to the Dail Eireann by the Minister of Posts & Telegraphs, Mr. Walsh, shows the following development of the Irish Free State Telephone system:—

	1922.	1926.
Exchanges	194	388
Call Offices	552	826
Subscribers	19,101	22,946

According to the *Star*, an aeroplane in the London-Paris service, which landed at Le Bourget on May 27, presented a comet-like appearance, trailing after it a lengthy tail, which proved to be copper wire.

An hour before its arrival (says Reuter) a telegram was received from Croydon, stating that a Paris aeroplane, in rising, had carried away 50 yards of telephone wire, and adding, "Please return wire as promptly as possible."

The wire in question was sent back to Croydon inside, instead of outside the plane.

The League of Nations having released £1,000,000 of the loan to Austria for subterranean telephone cables, it is expected, according to a Press report, that the cable from Vienna to the German frontier at Passau will be finished by the New Year.

This opens out interesting possibilities of conversation between London and Vienna when the full Anglo-German service has got going.

The Hungarian Post Office, according to Reuter's Trade Service, is to spend a large sum on improvements, including the reorganisation of the Budapest telephone system. It has been decided to introduce an entirely new automatic system. The Budapest system, with three exchanges, is now sufficient for 37,000 subscribers, which figure is to be increased by two stages to 65,000, and the service will be improved by laying subterranean cables. The sums required by the Post Office for the realisation of the plan will be loaned by the State.

The development of the Government-owned telephone system in France has improved since the war, but long-distance lines are wholly inadequate, while rural lines are almost unknown. The first of the five long-distance cables planned, the one to Strasbourg, is to be completed shortly. In June, 1923, the French Parliament voted to replace with automatic equipment the manual systems in a number of the larger cities. An appropriation was made for this purpose, but subsequent depreciation of the franc rendered it inadequate, though Nice, with 4,900 lines; Orleans, with 3,200 lines; and Dieppe and Vichy, with 800 lines, each, have been changed over, and 5,000 lines at Le Havre have been finished but not yet placed in operation. Contracts for the installation of automatic systems at Bordeaux and Lyon have been let and the others at Nantes, Reims, Colmar, and Fontainebleau. The Government has appropriated 210,000,000 fr. for an automatic system in Paris. The first contract will be for 40,000 lines, and ultimately there are to be 130,000, says *Commerce Reports*. Eleven new exchange buildings, to supplement the present 14, are now under construction.

According to a report presented by the electrical section of the Commission on the Restoration of Capital in Industry, the increase in telephone apparatus in Russia amounted to 16% in 1923, 16.3% in 1924, and 27.5% in 1925. In order to meet the demand in the present year it will be necessary for the Low-Pressure Trust to manufacture 85,000 telephones and 40,000 line switchboards. The further expansion comprises the production of 100,000 telephones in 1926-27 and 60,000 line switchboards, and 110,000 and 70,000 respectively in 1927-28. At the end of five years the output of telephones must be 125,000, while it is foreshadowed that the manufacture of telegraph apparatus will be diminished in that period.—(*Electrical Review*.)

THE RUGBY RADIO STATION OF THE BRITISH POST OFFICE.*

BY E. H. SHAUGHNESSY, O.B.E., M.INST.E.E.

(Continued from page 203.)

FIG. 11 is a schematic diagram showing the method of feeding the high-tension d.c. supply through a selected excitation unit to the power units by means of the busbars, and the method of paralleling the power units by means of the same busbars. It will be observed that there are three busbars running the length of the installation for the anode, grid, and filament (earthed) respectively, and that to bring a particular unit into operation in parallel with others it is only necessary to connect it to the busbars by one 3-way switch, and to light the filaments by means of the filament switch for that unit.

In order to simplify this system of paralleling, all apparatus proper to the complete amplifier formed by the power units as a whole, such as anode choke, grid leak, &c., are provided in duplicate and placed inside the respective excitation units.

FILAMENT SUPPLY.

The filament supply for the power units and the 50 kW stage is at 416 volts, three-phase, 100 cycles transformed down to the required voltage for the filaments (about 20 volts) by transformers in the units themselves. As previously stated, a Tirrill regulator is provided for the 416-volt supply to keep the voltage on the valve filaments constant; this is very important from the point of view of conserving the life of the valves. The filament load of each power unit and each 50-kW stage is balanced between the three phases so as to reduce the effect of any periodic change of emission current due to the use of alternating current for filament heating.

The filament supply for the 4-kW stage is at 15-20 volts d.c. supplied by one of the generators in the auxiliary machine room.

THE EXCITATION UNIT.

The 4-kW stage utilizes glass valves of the so-called 600-watt type—i.e. capable of a dissipation of 600 watts—and the panel can be equipped with 1, 2 or 3 of such valves. The valves are mounted on insulators fitted on the back of the slate panel on which the instruments for this stage are mounted.

The 50-kW stage utilizes three water-cooled valves similar to those in the power units, and the manner of mounting, &c., is similar to that of the power units.

The coils forming the inductances of the high-frequency circuits of both stages are constructed of cable of insulated and stranded wires, the cable being wound on a framework of American whitewood in a similar manner to that adopted for the large tuning inductances described later. The cable of the 4-kW stage inductance is 243.36 S.W.G. and that of the 50-kW stage is 729.36 S.W.G. The condensers of these high-frequency circuits are mica condensers in oil.

The safety devices, relays, &c., are similar to those used in connexion with the power units.

Associated with each excitation unit is an auxiliary machine unit consisting of one motor driving four generators. These generators have the following ratings and are utilized for the following purposes:—

- (1) 500-1,500 volts, $\frac{1}{4}$ amp. Anode supply for various amplifications stages of tuning-fork unit.
- (2) 15-20 volts, 60 amps. Filament supply for 4-kW stage, and also for tuning-fork unit by means of potentiometer.
- (3) 40-600 volts, 12 amps. Grid-bias voltage for power units.
- (4) 200-600 volts, 1.5 amps. Grid-bias voltage for 50-kW stage and also for 4-kW stage by means of potentiometer.

The motor driving this unit has a remote controlled starter so that all the various auxiliary powers required are obtained by the pressing of one button at the control table.

With such a chain of amplifiers as that forming this installation one probable difficulty to be combated is the self-oscillation of the system in whole or part due to retroaction from the later to the earlier stages, but this tendency to self-oscillation can be reduced by very careful screening between the various stages. The tuning-fork unit is made up in the form of two copper boxes with copper partitions between the different stages and tight-fitting copper lids to the various compartments. The excitation units and tuning-fork units are placed inside a screened enclosure, the sides and top of which are formed of copper mesh (14 to the inch) mounted on a suitable framework. Internal partitions of similar copper mesh complete the screening between the tuning-fork unit, the 4-kW stage and the 50-kW stage respectively.

*Paper read before the Telephone and Telegraph Society of London.

CONSIDERATIONS IN REGARD TO THE SIZE OF POWER UNIT.

The number of valves used for a high-power valve transmitter should be reduced to a minimum by using the most powerful valve available as a unit. When the design for Rugby was prepared, the largest power valve commercially available which had been subjected to severe traffic tests was the Western Electric water-cooled valve, which is capable of dealing with an input of 20 kW, of giving an output of 10 kW and continuously dissipating 10 kW when operated at a d.c. anode voltage of 10,000 volts—the filament consumption being 41 amperes at 22 volts. This type of valve had been tested at 13,000 volts with an output of 14 kW. The specification stipulated that all valves should be tested at an output of 12 kW with 12,000 volts on the anode. All the valves used in the installation were manufactured by the Western Electric Co. at New Southgate, England.

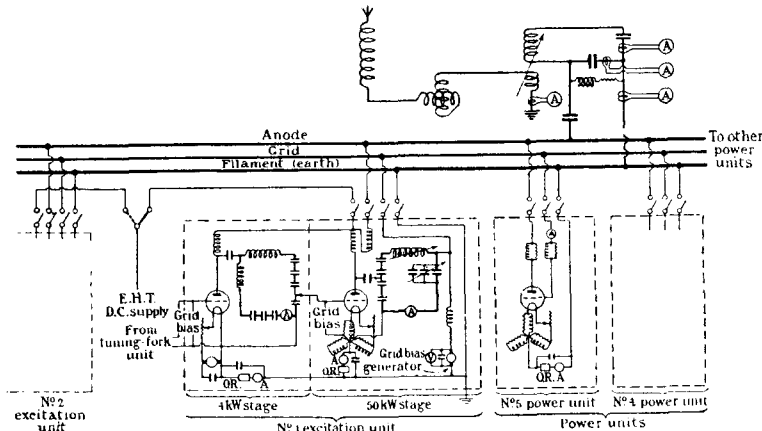


FIG. 11.

An efficiency of the order of 95% can be expected from the coupled circuit to the antenna, which means that for an aerial power of 500 kW an output from the valves of about 520-530 kW is required. The determining factors in deciding the size and number of the power units were as follows:—

- (1) The number of valves in each unit should be preferably a multiple of 3 in order to permit the balancing of the filaments between the 3 phases.
- (2) The number of units must not be unduly large, in order to avoid complications of wiring and excessive duplication of meters, &c.
- (3) The number of units should be sufficient to enable the number of valves in use to be varied in suitable steps (a) for the station to work on low power if this proves to be economically desirable, or (b) for the utilisation of a smaller number of greater power valves as the manufacturing technique of power valves develops.
- (4) The number of units should be suitable to provide two transmissions of the order of 300-kW aerial power and still leave a spare unit.

These considerations led to the decision to provide 5 power units, each capable of an output of 180 kW from 18 10-kW output water-cooled valves. With this equipment 3 power units would be required for a 500-kW aerial power transmission, leaving two units spare; also two transmissions of over 300 kW aerial power could be undertaken by using two power units for each, leaving one unit as a spare in reserve.

THE POWER UNIT.

The power unit consisting of 18 valves is a rectangular enclosure arranged with 9 valves on each side and a front slate panel containing the meters.

The 3 busbars run above the various power units and the excitation units and each power unit can be connected to the busbars by a 3-pole switch. The 3-pole switch for connecting a power unit to these busbars cannot be operated until the Bostwick gates on the sides of the unit have been closed and locked, and the keys locked in the switch itself: the converse holds that the gates of the unit cannot be opened until the keys for opening them have been released by the opening of the switch, which "earths" all parts of the power unit. These interlocking devices render the operation of the power units quite safe.

The front panel of a power unit carries the following:—

- (1) Ammeter reading high-frequency feed current from the power unit into the oscillating circuit.
- (2) Ammeter reading anode d.c. feed current to power unit from h.t. machines.
- (3) Ammeter reading mean d.c. grid current of power unit.
- (4) Recording ammeter of filament current, by means of which the actual running time of unit and the life of individual valves can be obtained.

- (5) An overload relay for the complete power unit which trips the main high-tension d.c. switch.
- (6) An "Electroflo" meter which reads the actual total rate of flow of water through the valve jackets of the unit.
- (7) A relay in association with the "Electroflo" meter which operates if the flow of water falls below a certain amount, and trips the main high-tension d.c. switch.

Fig. 12 is a section through a power unit parallel to the front, showing the juxtaposition of the various panels. Slate panels have been used in all cases for mounting the various apparatus and fittings, these slate panels being supported and insulated from the earthed iron framework by suitable porcelain insulators.

The two anode panels are supported from the floor by 4 18-in. insulators. These insulators also support the copper water pipes between these panels which not only act as headers for the water supply to the anodes but also as the anode busbars for the valves in the panel.

The anode panels carry the valves in their water jackets and the overload relays in the individual anode circuits. In the event of any particular valve taking an excess current due to softness or any other reason, the corresponding relay operates, releasing a hammer normally held up by the armature of the relay which in turn operates a mechanism which trips the high-tension d.c. switch by breaking the "holding coil" circuit. The arrangement has proved to be very effective, and oscillograms which have been taken show that the h.t. switch is broken in about $\frac{1}{3}$ second following an excess of current through the relay.

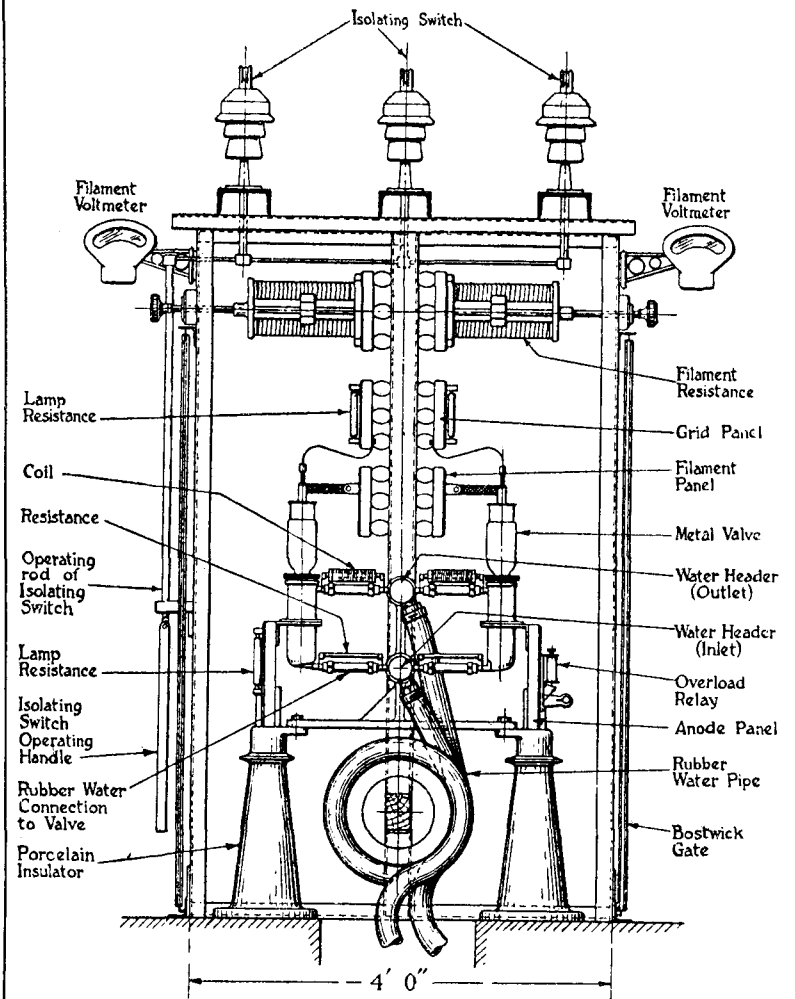


FIG. 12. SECTION OF POWER UNIT.

The water system used for cooling the anodes is a closed system using distilled water which flows by gravity through the valves. The water is pumped from the bottom tank back to the upper supply tank through a "water cooler" where the heat is extracted by an independent circulating-water system.

The distilled water is supplied to the anodes of the power unit through 30 ft. of 2-in. diam. rubber hose wound on a horizontal wooden drum at the bottom of the power units. This rubber hose feeds the 3-in. copper header which passes down through the centre of the unit and which in turn feeds the individual valves on each side through short lengths of rubber tubing to

the lower ends of the valve jackets. The outlet water from the upper ends of the valve jackets passes to a similar header which discharges through another length of 2-in. hose similar to that used for the inlet water and wrapped round the same drum. The long length of water in the rubber hose provides the necessary insulation of the anodes from the earthed metal parts of the water-cooling system, and the drum carrying this hose is a part of the insulated anode system. The short lengths of rubber tube from the headers to the valves provide the insulation required between valves to permit the insertion of relays, coils, &c., in the individual valve anode circuits. The porcelain floor insulators and the large rubber hose are shown in Fig. 12.

The insulation of the anode system of one power unit under working conditions with water flowing is of the order of 520,000 ohms, giving a leakage current through the water at 10,000 volts of only 20 mA.

Immediately above the anode panels are the filament panels which carry the filament busbars for the unit and the flexible braided leads from these busbars to the separate valve filaments. Above the filament panels are the grid panels, which carry the grid busbar (in the form of a complete loop of copper strip between the panels) and also any "stopper" circuits referred to later.

Above the grid panels are the filament rheostats, one of which is provided for each valve, together with a volt-meter key to enable the actual filament voltage to be read by means of a swinging voltmeter at the end of the panel. This independent variation of the filament voltage in order to obtain the rated value for each valve is very necessary in order to conserve the life of the valves, the life being seriously shortened if the filament is run continuously slightly above its rated voltage.

THE PARALLELING OF VALVES IN A UNIT.

One of the difficulties in designing a large power transmitter using a large number of valves is the tendency of such valves to "self-oscillate" individually, or in groups, the inter-electrode capacity of adjoining valves or groups of valves forming the condenser of the oscillating circuit in association with the inductance of the connecting leads, &c. These difficulties are increased with water-cooled valves where the existence of the water jacket increases the inter-valve and inter-electrode capacities very considerably. Every such difficulty of this nature must be examined and dealt with separately and, generally speaking, the oscillations can be suppressed and the system made stable by one or more of the following devices:—

- (1) The provision of a small condenser between the grid and filament of each valve, as close to the electrodes as possible, in order to make the grid-filament impedance capacitive.
- (2) The use of "stopper" circuits in the individual anode, and/or grid circuits consisting of an inductance in parallel with a resistance high compared with the impedance of the inductance at the transmitted frequency. For undesired oscillations, however, which are of a much higher frequency, the added inductance becomes a large proportion of the inductance of the circuit and the resistance across it provides sufficient damping for the conditions of self-oscillation of the valves to be unfulfilled (Western Electric Co.).
- (3) The insertion of a series resistance in the individual anode or grid circuits which act as a damping for self-oscillation but are not of high enough value to cause a large power loss at the transmitted frequency.

The best arrangements for a particular case must be obtained by experiment, and quite a number of combinations of such devices would probably be equally successful. It is generally desirable to allow a factor of safety on such devices by fitting more than the minimum absolutely essential, so as to provide for the contingency of faults which might otherwise permit self-oscillation with the consequent possible destruction of a number of costly valves.

The arrangements used successfully at Rugby are:—

- (1) Two small condensers of 400 μF each are mounted on each valve between the grid and each end of the filament.
- (2) A series non-inductive resistance of 100 ohms between each individual grid and the grid busbar.
- (3) The anode feed from the individual valves to the top water header (which acts as the anode busbar) consists of an inductance of 50 μH in parallel with a non-inductive resistance of 60 ohms to the same header and a similar non-inductive resistance to the bottom water header, these two headers being metallically connected at the end of the panel.

Fig. 13 gives the circuit arrangements of a complete power unit.

THE PARALLELING OF POWER UNITS.

The paralleling of the power units themselves also involves consideration as to the method of prevention of inter-oscillation between power units.

At Rugby the combined anode of the power unit is fed to the main anode busbar through a "stopper" circuit consisting of an inductance of

100 μH in parallel with a resistance of morganite plates of 8.5 ohms. The combined grid of the power unit is fed to the main grid busbar through a "stopper" circuit consisting of an inductance of 50 μH in parallel with a resistance of 300 ohms formed by 6 straight-filament lamps in series. The positions of these in the circuit are shown in Fig. 13.

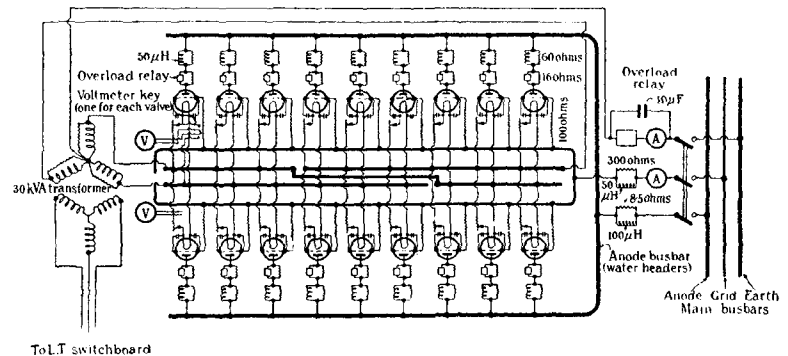


FIG. 13.—WIRING DIAGRAM OF POWER UNIT.

These "stopper" circuits are fitted at the back of the power unit in the space above the filament transformer and immediately below the 3-pole power unit isolating switch to two terminals of one side of which they are connected.

SAFETY DEVICES AND CONTROL CIRCUIT.

The safety devices can be divided into two groups:—

- (1) Those for the protection of the personnel.
- (2) Those for the protection of plant.

For the protection of personnel, the interlocking of the gates of the power units as described previously and the earthing of the unit when the isolating switch is open, safeguards the station staff from electric shock when working on the power units. A similar arrangement is provided in connexion with each excitation unit. The 4-pole isolating switch (see Fig. 11) which connects the high-tension d.c. power to the excitation unit and the excitation unit to the main busbars is similarly interlocked with the gates of the excitation unit enclosure.

The protection of plant is of special importance when using valves because, firstly, the closing of the h.t. switch for a very short period under incorrect conditions might result in the destruction of a number of valves, and secondly, there is a possibility of valve failures which amount to a short-circuit of the 10,000-volt d.c. supply. All the safety devices and relays are therefore linked up in one series circuit through the "holding" coil of the high-tension d.c. switch. A disconnection in any one place will then prevent the switch from being closed, and also the breaking of the circuit at any point during transmission due to a fault or an overload will open the high-tension d.c. switch.

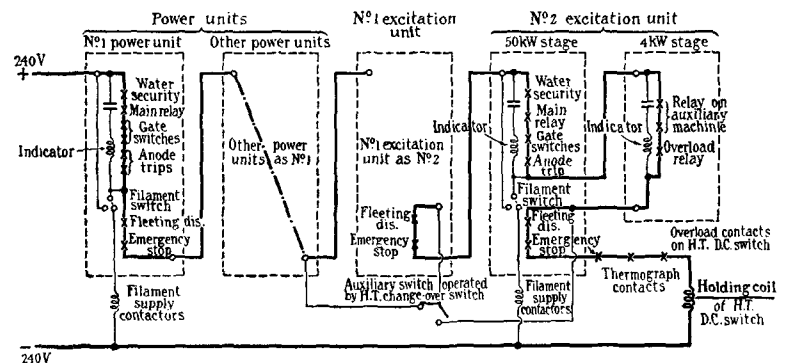


FIG. 14.—SKELETON DIAGRAM OF CONTROL CIRCUIT.

Fig. 14 is a skeleton diagram showing the circuit arrangement of this "series" control wiring through the "holding" coil of the high-tension d.c. switch. The main facts to be noticed in connexion with it are as follow:—

- (1) The series circuit includes one of the two excitation units and whatever power units are in use.
- (2) The operation of the hand-operated switch which changes over the h.t. supply from one excitation unit to the other automatically changes over the control wiring and short-circuits that of the excitation unit not in use to permit access for repairs, adjustments, &c.

- (3) The placing of the filament switch on a power unit to the "off" position short-circuits the control wiring of that particular unit, and enables work to be done on that unit while the others are in use.
- (4) The placing of the filament switch on a power unit to the "on" position connects the primary of the filament transformer to the filament supply busbars by means of a remote-controlled contactor. The 240-volt supply to operate this contactor is obtained via the control wiring as shown in the diagram, thus ensuring that the filaments cannot be lighted until water flowing through the valve jackets has closed a contact earlier in the circuit.
- (5) An indicator is fitted on the front of each power unit panel and placed in series with a condenser across all the contacts of that particular unit. When a break in the control circuit occurs, the charging current from the 240-volt mains into the condenser drops the indicator and gives a visual indication of the particular unit at which the overload or other trouble has occurred.

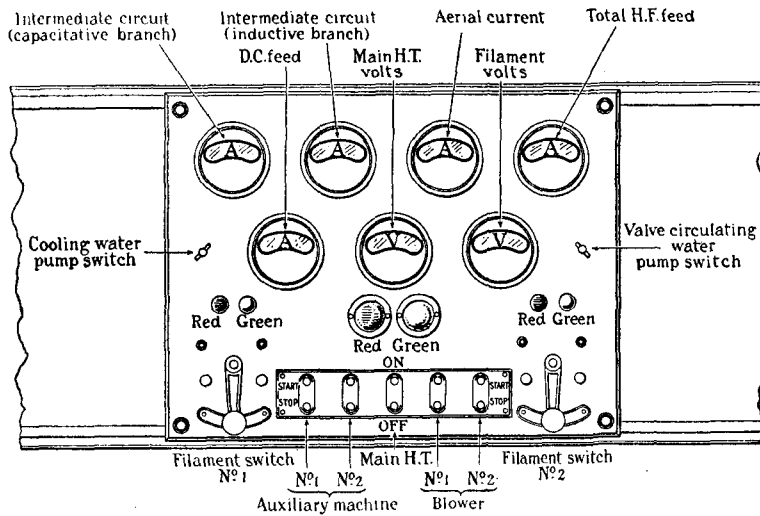


FIG. 15.—CONTROL TABLE.

The operating points of the control circuit may be summarised as follows:—

- (1) On each power unit.
 - (a) Main overload relay.
 - (b) Trip operated by individual anode relays.
 - (c) Water-flow relay.
 - (d) Gate switches.
 - (e) A fleeting disconnection during the movement of the power unit isolating switch, to ensure that a unit is not switched on to the busbars while other units are in operation.
 - (f) Emergency push-button.
- (2) On each excitation unit.
 - (a) Main overload relay for 50-kW stage.
 - (b) Trip operated by individual anode relays of 50-kW stage.
 - (c) Water-flow relay for 50-kW stage.
 - (d) Overload relay for 4-kW stage.
 - (e) Gate switches.
 - (f) A fleeting disconnection for the excitation units similar to that of (1c) for power units.
 - (g) A polarised relay in association with one of the grid-bias generators to ensure that the auxiliary machine is running and that the bias is of correct polarity.
 - (h) Emergency push-button.
- (3) External to power and excitation units.
 - (a) A contact in association with a recording thermograph which records the temperature of both the inlet and outlet temperature of the valve-cooling water. This contact is arranged to open if the outlet water exceeds a predetermined temperature.
 - (b) Emergency switch in condenser room.
 - (c) Overload coil of high-tension d.c. switch.
 - (d) Release button on control table.

THE CONTROL TABLE.

The position of the control table in the layout of the transmitting room can be seen from Fig. 9. The slate panel contains all the essential controls and the most important meters of the wireless transmitter. This equipment is shown in Fig. 15 and consists of:—

- (1) Press-buttons to start and stop auxiliary machines.
- (2) Press-buttons to start and stop air compressor for keys.
- (3) Press-buttons to close and open high-tension d.c. switch.
- (4) Switch to start distilled-water pump.
- (5) Switch to start cooling-water pump.
- (6) Switch to close and open main filament supply switch.
- (7) Filament supply voltmeter.
- (8) High-tension d.c. voltmeter.
- (9) High-tension d.c. feed ammeter.
- (10) Ammeter reading high-frequency feed current to main oscillating circuit.
- (11) Ammeter reading high-frequency current in capacitive arm of primary oscillating circuit.
- (12) Ammeter reading high-frequency current in inductive arm.
- (13) Aerial ammeter.

The apparatus terminating the land line from the Central Telegraph Office, London, which controls the transmission from the station, is fitted on the right-hand side of the control panel so that the duty engineer can check the signals passing through the transmitter and also speak to the controlling telegraph office as may be necessary.

On the table on the left-hand side of the control panel is fitted an "engine-room telegraph" operated by push-buttons to enable the power requirements to be signalled to the power house. A loudspeaker and wireless

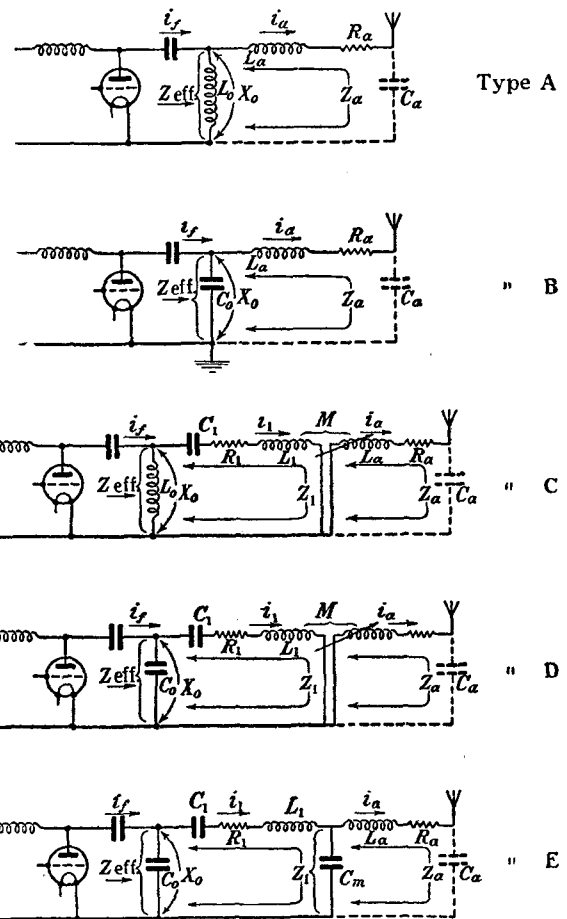


FIG. 16.—TYPES OF OUTPUT CIRCUITS.

recorder are provided for checking the actual signals transmitted from the aerial. In addition there are fitted on this table two press-buttons controlling a motor-driven variometer in the aerial circuit to compensate for any changes in the aerial constants due to weather, &c.

The duty engineer, therefore, has full control of the entire station in detail from his position at the control table.

The high-frequency and other electrical measuring instruments fitted in the valve transmitting plant were supplied by Messrs. Everett, Edgcombe.

TYPE AND ELECTRICAL PROPORTIONS OF COUPLED AERIAL CIRCUIT.

Any large power valve transmitter should be provided with a coupled circuit, since the use of a valve transmitter at reasonably high efficiencies necessitates the production of a certain proportion of harmonics which should be filtered from the aerial. This involves a consideration of the following points:—

- (1) Method to be adopted to produce necessary voltage variation on anode (commonly referred to as "type of anode tap.")
- (2) Method of coupling to aerial, i.e. inductive or capacitive.
- (3) Coefficient of coupling between aerial and primary circuit.
- (4) Proportion of inductance to capacity in primary circuit.

The diagrams of Fig. 16* indicate various circuit arrangements which are referred to as Type A, B, C, D and E respectively.

For an "anode tap" the use of a capacity rather than inductance brings with it a reduction of the harmonics in the aerial in the ratio of $1/m^2$ for the m th harmonic: that is, types B and D are m^2 times better than types A and C respectively. For preliminary tuning, the use of capacity rather than inductance brings with it the disadvantage of having to be tapped in relatively big steps instead of being continuously variable as with an inductance; but, within these steps, variations of coupling between the primary circuit and the antenna circuit will produce equivalent changes in the adjustment of the complete circuit.

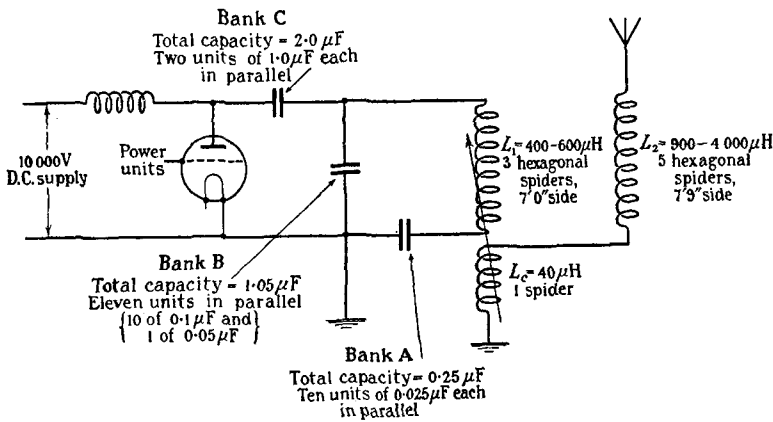


FIG. 17.—COUPLED AERIAL CIRCUIT.

Similar arguments apply to the method of coupling the primary circuit to the antenna circuit; that is, as regards the undesirable emission of harmonics, type E circuit is m^2 times better than type D, and therefore m^4 times better than type C. The ideal circuit, therefore, from the point of view of harmonic emissions is that shown as type E with capacitive coupling to both anode and aerial.

In practice, however, when designing a circuit for an aerial not yet erected of which the resistance and capacity are not known accurately, it would be expensive to provide a range of condenser values for both anode and aerial couplings which would cover both all the large and small adjustments required during the experimental period of tuning up the plant. If, however, a type D circuit is used with a condenser having a relatively coarse adjustment for the anode coupling and a continuously variable inductive coupling for the aerial, all necessary adjustments for the preliminary testing can be made with facility; then when the constants of the aerial circuit are known and the preliminary tuning has been completed, if necessary the change from type D to type E can readily be made. It has, however, been found unnecessary to depart from the type D circuit installed.

As regards the emission of harmonics, the improvement obtained by using a coupled circuit of type D instead of a plain aerial circuit is dependent among other factors upon the product of the decrements of the primary and aerial circuits. When a low-decrement aerial tuning inductance is provided, the decrement of the aerial circuit at a given frequency is practically fixed, being mainly dependent upon the external part of the circuit.

It is, therefore, important that the decrement of the primary circuit be made low, and this involves the provision of the most efficient inductance coil and condenser having very low loss. The cost of the primary circuit is roughly proportional to the kVA with which it has to deal except at the higher voltages where the cost increases rather more rapidly than the kVA.

The efficiency of the coupled circuit and the improvement as regards harmonic emission obtained by using the coupled circuit are both independent of the ratio of inductance to capacity in the primary circuit. Under these

*Taken from a paper being prepared by Mr. R. V. Hansford and Mr. Faulkner for presentation to the Institution.

circumstances the actual value of the inductance was chosen from a consideration of the following:—

- (1) The cost of the coil decreases slightly as its inductance is decreased.
- (2) Above a certain working voltage the cost of the condenser increases at a more rapid rate than its capacity.
- (3) The cost and difficulty of insulating leads are increased when high working voltages are increased.

This led to the decision to have a primary circuit inductance of the low value of 500 μH. The values of the condensers making up the primary oscillating circuit are given in Fig. 17. The condensers used are mica condensers immersed in oil, made by Messrs. Dubilier to meet the Post Office specification. These have a power factor of 0.00025 at the working frequency. The power factor was tested by an 8-hours' run on each unit on full load and voltage at the maker's works. In addition to the power factor tests each unit of the condenser banks (Fig. 17) was tested at the following voltages:—

- Bank A—68,000 volts (R.M.S.) at 50 cycles.
- Bank B—25,000 volts (R.M.S.) at 50 cycles.
- Bank C—35,000 volts (R.M.S.) at 50 cycles.

The primary circuit is designed to carry a current of 630 amperes, and at this current the value of the R.M.S. voltage applied to the condenser would be 33,000 volts (peak value 46,500 volts) and the kVA 20,800. Actually at present the value of the working primary current is about 300 amperes.

At Leafield the condensers, consisting of aluminium plates immersed in oil and made and erected by the Post Office engineers, have been working for about 2 years with a current of 260 amperes and a voltage of 68,000 (R.M.S.), dealing with 18,000 kVA. The Dubilier type of condenser is much less bulky than the Leafield type and its adoption enabled space to be saved in the Rugby building.

(To be continued.)

TELEPHONE PROGRESS AT MANCHESTER.

A Manchester correspondent writes: at the end of January 1922 the telephone stations at Manchester were 50,000, the first provincial district to achieve this figure. At about this time the leading districts were:—

Manchester	...	...	...	...	...	...	50,000
Liverpool	...	...	...	...	...	...	45,000
Glasgow	...	...	...	...	...	...	44,000
Birmingham	...	...	...	...	...	...	35,000
West Yorks	...	...	...	...	...	...	33,000

At the end of May 1926, Manchester reached the 75,000 mark, an increase of 25,000 stations in four years and four months, its nearest competitors being approximately as follows:—

Liverpool	...	...	...	...	...	...	58,700
North Midlands	...	...	...	...	...	...	58,500
West Yorks	...	...	...	...	...	...	55,800
Birmingham	...	...	...	...	...	...	52,800
Glasgow	...	...	...	...	...	...	52,500

ECHOES OF THE STRIKE.

Victoria Chief Supervisor reports that the following message was given verbally by the Chief Civil Commissioner to the late duty telephonist at the Private Branch Exchange on the 17th May:—

Offices of the Chief Civil Commissioner,
Cabinet and Transport, Whitehall Gardens.
Victoria 8660 and 9250.

Sir William Mitchell-Thomson, Chief Civil Commissioner, and Staff, wish to thank the Telephonists for the help they gave to them during the General Strike; for their courtesy and for the splendid attention received on each call that was made. They have never had such prompt attention from any exchange before, and feel they cannot pass out of this office without thanking the switchboard staff for their efforts, which were thoroughly appreciated.

May 26, 1926.

Letters of thanks and appreciation were also received from:—

Walter Hepworth & Co., Yeast Importers (London Wall Exchange), Boyes and Auger, Flour Factors (Royal), Captain Jones, on behalf of Commanding Officer, 10th Bn. London Regiment (Clissold), Chairman, Volunteer Service Committee, Grays (Grays), United Yeast Co. and Board of Trade Emergency Yeast Distribution (Clerkenwell), Flour Milling Employers, Federation (Sloane and Kensington), F. S. Hammond, 11th Div. London Regiment (North), Dr. M. J. Houghton (Riverside), Mr. Aldworth Oliver (Riverside), National Adult School Union (Museum), Lady Guthrie (Grosvenor), R. W. James (Bromley).

SCHOOLBOY'S ESCAPE AT RUGBY WIRELESS STATION.

We reprint the following account from the *Rugby Observer* of an incident which does not appear to have received much attention in the London Press. People are by this time well enough aware of the danger to be expected from "live" rails and other high-tension conductors, but are apparently not alive to the risks of trespassing on a large wireless station:—

Rugby Radio Station,
Hillmorton,
Near Rugby.
June 7, 1926.

To the Editor, *Rugby Observer*, Rugby.

Dear Sir, I shall be glad if you will give prominence in your columns to the fact that it is dangerous to trespass on the site of the Rugby Radio Station at Hillmorton.

On Friday last a schoolboy was taken to hospital severely burned and suffering from shock through climbing on one of the stays at this station. It was, indeed, very fortunate that he was not killed, as he made contact with a point at 10,000 volts above earth potential.—Yours faithfully,

H. FAULKNER
(Engineer-in-Charge).

The above letter summarises an alarming experience which befell a member of Rugby School who, in company with two companions, ventured on to the station area last Friday.

Having cycled over from Rugby, the boys crossed a field on to the Radio Station site unobserved—at least by anyone in authority—and made their way to a central position, where they concentrated their attention on one of the stays supporting a mast, which is embedded in an anchor block of concrete.

One of the boys mounted the block, and proceeded to climb up the stay, which, though insulated from the ground, contained a powerful electric current. The boy ascended ten or twelve feet, and then received a shock. He shouted with pain and fell to the ground, with his head and hands badly burnt, and his cap scorched.

The other two boys greatly alarmed, ran to the office, about 300 yards away, and informed one of the officers on duty that an accident had occurred. He proceeded to the spot with first-aid appliances, and found the injured boy lying on the ground in a dazed condition.

The wounds were dressed and a stimulant was administered, and the boy was then conveyed in a motor-car to the Hospital of St. Cross, whence, after treatment, he was transferred to the School Sanatorium. He is now reported to be making favourable progress towards recovery.

That the boy suffered no worse consequences than shock and severe burns is regarded as miraculous. Probably the contact was not perfect, otherwise instant death by electrocution must have ensued. Those conversant with the risks run consider him to have had an extremely lucky escape.

Mr. Faulkner, the engineer-in-charge at the Radio station, said: "People should be warned not to come on to the site at all. It is impossible to label every point of danger; and unless people are acquainted with the working of the station and know exactly what is dangerous and where the dangers are, the best thing is to assume it is all dangerous and to keep away from the station altogether.

"Apart from the risks of electric shock, it is possible something might fall from the aerials and thus cause danger of another kind.

"The station, of course, was transmitting at the time of the accident, but even when it is not doing so one might get a "static" shock in thundery weather—something like a mild lightning shock."

PRESENTATION TO MR. A. C. SCOTT, ABERDEEN.

AN interesting ceremony took place in the Aberdeen District Office on May 26 when the staff of the Chief Clerk's Section met to congratulate Mr. A. C. Scott, Overseer, on the completion of 25 years service and to present him with a tangible token of the esteem in which he is held by the members of the staff. Mr. A. Clow, Chief Clerk, presided, and, after referring in happy terms to Mr. Scott's long and faithful service, called on Mr. P. Edmond, District Manager, to present Mr. Scott with a handsomely equipped oak smoker's cabinet, which was also well filled with the fragrant weed. In doing so Mr. Edmond made reference to Mr. Scott's many good qualities and conveyed to him the congratulations of the staff. Mr. A. Tough, Clerical Officer, added a few words of appreciation, and thereafter Mr. Scott replied, thanking the staff for their kindness and recalling several interesting incidents in his years of service, concluding by testifying to the kindly feelings which have always existed between him and the other members of the staff.

THE FUTURE OF TELEGRAPHY.*

By G. T. ARCHIBALD.

So much has been said about the British Telegraph Service during the past few years that it is a matter of difficulty to steer clear of points which have already been dealt with adequately by other commentators. It seems to me, however, that there is plenty of scope for mental exercise if we are to keep pace with the wonderful development in machine telegraphy, and for that reason I have thought it desirable to choose as the title of my paper "The Future of Telegraphy."

You must be prepared for a disappointment: much that I shall say will be trite; I can offer for your criticism no new proposals for increasing the attractiveness of the service, and I am not going to pretend to be able to tell you how to turn the Telegraph Service into a financial success. I shall, however, deal at some length with certain aspects of past and present telegraph practice which may, I hope, help you to make up your minds concerning the future, but I cannot and I feel sure you will not expect me, to undertake the task of trying to make them up for you.

You will not wish me to bore you with a long dissertation on the growth of the service. We cannot live on our past, however glorious it may have been, so I propose first to consider with you some of the factors in the regrettable but, to my mind, inevitable reduction in the number of telegrams dealt with.

I make bold to claim that the loss of traffic is not due to inefficiency, either operating or administrative. You may be interested to know that in 1871 delay in London averaged about 90 minutes per telegram. There never was a time in the history of the service when the average transit time was lower than it is to-day. If this be admitted we must search for other influences, and if we are to get at the truth we must, as reasonable men and women, look facts fully in the face. Traffic figures will not help us to prove anything more than that there has been a steady and continuous reduction of traffic since 1921, so I shall not quote them.

Many factors have contributed and are still contributing to the loss of traffic which has not yet, I am afraid, reached rock bottom. I am quite well aware that the largest annual total number of telegrams was dealt with in 1921 but the conditions during that year were exceptional and should be ignored.

From 1870, or earlier if you like, and throughout the remainder of the Victorian period there was no serious rival to telegraphy in the matter of rapid communications. The public were compelled, therefore, to use it when an urgent communication became necessary; it is due largely to that fact that there are upwards of 12,000 telegraph offices in England, Scotland and Northern Ireland. But from the moment the Post Office took over the trunk telephone system—in 1895—the telephone became a competitor. Slowly but surely it supplanted the telegraph for local communications and ultimately, as it developed, made itself felt in the 50 mile radius, then in the 100 mile radius and finally it began to worm its way into long distance communications.

Telephone competition is bound to become more severe as the cost of lines is reduced, as it is being reduced, and the quality of service is improved, as it is being improved. No one, not even the most silver-tongued telegraph traffic officer can persuade the Birmingham public to telegraph to Glasgow if they can get through by telephone and transact their business within thirty minutes, because it must be obvious to the oldest fogey amongst us that the telegraph service cannot in any circumstances, compete with a telephone service of that kind. It will take time to cheapen the long distance telephone service and at the moment the telephone is not a really serious rival in that field. I warn you, however, that it may only be a matter of time, the commercial public will not be slow to press for more and better long distance trunk telephone facilities, just as they pressed formerly for increased telegraph facilities, when they realise that satisfactory speech and hearing conditions are available.

The telephone has, assuredly, changed commercial practice to a considerable extent; it may change it still further within our lifetime. It has also become a power in the social and domestic life of the country and rightly so. It is a wonderful convenience to all those who are able to become subscribers and to those—and the number is growing—who patronise public call offices: I cannot therefore resist the conclusion that as the number of telephone users increases the number of telegraph users will decrease. In these days the doctor, the nurse, the veterinary surgeon, are all summoned to remote places by telephone, the police and other public bodies are using the telephone to a greater and greater extent, and the general public is becoming more and more accustomed to and familiar with call office facilities. I need not say more on the effect of the telephone on telegraph traffic; most of us would rather spend twopence on a telephone call than indulge in the luxury of a shilling telegram, the treatment of which costs the State 1s. 8d.

What other modern inventions have exercised a pernicious influence on the telegraph?

* A paper read before the Birmingham Postal Telegraph and Telephone Society on Dec. 10, 1925.

Well, let us consider railway travelling, I can remember the time when my father telegraphed advising his safe arrival at Liverpool after a journey of 100 miles. How many people do so now? Cheaper and better railway facilities have encouraged people to travel more and more frequently and farther and farther afield. Familiarity breeds contempt we are told, and as travelling has become an essential feature of modern life we no longer think it necessary to wire about our safe arrival: hotel notepaper and the picture postcard meeting all our requirements in that direction.

Then there is the motor car, the motor cycle and their poor relation the push bike, all of which have helped to make telegraphing unnecessary. Those who are fortunate enough to own a motor driven machine would rather spend a shilling on petrol than on a telegram, and if they want a friend to come for lunch they run over in the car and bring the guest back, etc., etc.

Now let us look at the commercial world. Not so very long ago, as many of you will remember, the staple industries of this country were conducted by hosts of relatively small firms in keen competition. At that time it was no uncommon thing for a firm to wire for prices to six or more competitive concerns, and prices were governed by farthings. In those days, too, many firms made it a regular practice to send out prices by telegraph in order to attract business. In the process of time numbers of small firms became limited companies, then amalgamations with other companies in the same line of business took place and, ultimately, following American methods, these larger companies combined with others. This has happened in practically every industry in the country. Moreover, the small shopkeeper has been driven out by the multiple shop firms with central buying and distributing depots. Business is now in the hands of trusts, combines and rings; competition has been largely eliminated, and competitive prices are not often obtainable. The result from a telegraph point of view is that traffic has suffered to an appreciable extent. Let me give you a case in point. Quite recently I visited a coast town which is an important centre of the iron and steel trade. In the course of my enquiries I found that the iron works, some of the largest in the country, did not send more than five or six telegrams a day as compared with fifty a day before the company became part of a huge combine or trust. I was told that prices are now made and quoted from the combine headquarters at another place and that as the combine had absorbed a large number of similar concerns competitive prices were no longer obtainable. I was further informed that communication between the headquarters of the combine and its branches is invariably established by telephone, and the consequence is that telegraph business at the coast town and probably at many other towns has received a very nasty setback.

One further point in this connexion. Do we sufficiently realise the effect of the popularity of private wires? Stockbrokers, banks, etc., now communicate with their principal provincial houses and agents by means of private wires rented from the Post Office; in this way a considerable amount of traffic has been lost to the telegraph industry. There is a steady demand for private wires and if the Teletype Exchange system advocated by Mr. Donald Murray ever becomes practicable it will have the effect of further reducing the amount of telegraph traffic passing over the public wires.

Enough has now been said to prove that just as the railway killed the stage coach, just as the motor car killed the horse brougham, just as the steamship drove the sailing ship from the seas, just as the multiple shop is displacing the smaller trader, so other forms of communication and modern business methods are pushing the telegraph from its former proud position.

I have dealt with the question of traffic reduction at some length because it is most essential that we should fully realise the position so that we may be properly equipped for the consideration of the future of telegraphy.

You may be tempted to say, well the picture you have painted is not a pleasant one, and if it is a true representation of the facts there is not much to hope for. There I think you would be wrong.

The telephone is our most serious rival, but some years must elapse before long distance trunk telephone communication will be as inexpensive as the telegraph. The average distance (crow fly) from office of origin to destination of a telegram is about 150 miles. It will be many years before the telephone can make any appreciable effect upon the long distance telegraph traffic of upwards of 60,000,000 messages. Indeed, trade prosperity would probably help to keep telegraph traffic at approximately its present level. But we have to face the fact that any increase is problematical, however much we should all like to see it. Moreover the telephone, as we know it, cannot ever entirely displace the telegraph for the simple reason that there will always be millions of people who do not require it, and to whom the telegraph service will continue to be a convenience.

The view is held in some quarters that the combination of the telegraph and the telephone in the phonogram service may prove to be the salvation of the telegraph service, but it is too early to express any definite views on that subject. On the whole I think we may rest assured that telegraph instrument rooms will not become derelict for at least another twenty-five years, by which time many of us will have ceased to worry about material things and the others will be too busily occupied in more congenial pursuits to display more than a passing show of interest in the fate of the industry which held them as slaves for the greater part of their lives.

These, then, are the facts concerning telegraph traffic, as I understand them: I do not suggest that they are correct in every detail, nor do I profess that my view is the official view, but I would earnestly counsel you to think over the facts in order that you, in due course, may offer constructive contributions on the question of the future of the service.

I think we may now pass on to the consideration of the future of telegraphy. You may dismiss from your minds any suspicion that Head-

quarters is deliberately starving the telegraph service in order to encourage telephony; any such official attitude would be criminal, and you may take it for granted that no one would be so foolish as to accept responsibility for such a policy. You need look round your own office, note the vast quantity of Baudot and other machine telegraph apparatus installed during the past few years, and review the many improvements in circulation, addressing, etc., to be completely satisfied on the point.

Since the war 135 routes have been equipped with multiplex apparatus, seventeen have been equipped with start stop apparatus and many more will be equipped with the latter type of apparatus during the next few years.

Now what does this mean? It means that the future of telegraphy lies in machine telegraphs capable of dealing with more traffic than can be dealt with by Morse. It means a considerable saving in lines and line maintenance, it means, of course, some reduction in the number of telegraphists but it does not necessarily mean that there will be a corresponding decrease in the number of supervising positions. Already multiplex circuits fitted with the Baudot keyboard are being converted to type keyboard and automatic transmission at higher speeds. We cannot tell what the future has in store for us—after all these years telegraph invention is only in its infancy—but one thing is certain: everything possible will be done to get more and more work out of the lines and apparatus without calling upon the individual operator to expend any additional energy in dealing with the traffic. It means the creation of a new technique, not the abolition of a craft. True it means the displacement of the Morse code, but the skill necessary for the future telegraphy will not be less and may be greater under the conditions which we shall be called upon to face. Proficiency in touch typing can be attained in less time than that required for the attainment of proficiency in Morse manipulation, but when to touch typing skill is added the requisite technical skill to enable operators to obtain the best results out of their machines, I do not think it would be right to say that machine telegraphy, or press-the-button telegraphy as Mr. Murray calls it, is so simple as to depreciate the value of the operator to the extent that telegraph apparatus manufacturers would have us believe.

It seems clear that we must get rid of our Morse spectacles if we are to play our part in the great re-construction of telegraphy which has been embarked upon without fuss, without ostentation, and without the least suspicion of an attack upon the telegraphic operating art. There is work for all of us in this movement, there is need for the constructive talents which telegraphists possess in plenty, and there is scope for the exercise of those talents. If we can persuade ourselves that we are all members of a great brotherhood, imbued with the single idea of working for the common good, re-creating the service in such a way that we shall continue to deserve the commendation of the public, then, I think, we shall be progressing along lines which most of us dream of and which must inevitably make our job more pleasant and our minds more contented.

If we are agreed on this point it is our plain duty to co-operate in every effort that may be made to provide the best possible service consistent with economy. Economy is a blessed word. It is also a much overworked, much abused, and much misunderstood word, but please don't misunderstand me. In fact I am not going to run the risk of being misunderstood because we are going to agree upon what we don't mean by economy before we proceed to discuss what we do mean.

By economy we do not mean sweated labour, we do not mean cheap labour, we do not mean cheap and nasty materials and we do not mean a depreciation of our standard of efficiency. What then do we mean? We mean the simplification of our system, the use of up-to-date machinery and appliances and the suppression of irritating formalities, in other words we mean the frugal or wise use of men, material and money.

Some sceptic will say, yes it sounds very beautiful, we have heard this kind of thing before and nothing has come of it. I agree that it sounds beautiful, in fact it is an ideal, but I am not afraid to make this appeal to you because you have heard it before and nothing has come of it. I feel certain that "where there's a will there's a way." Let us then determine to be the pioneers in the movement.

You will naturally expect me to give you a lead if you are to join in the movement. It occurs to me that it might be possible to form a "Service" League or Guild in each town. The primary function of the League or Guild would be to consider how best working costs might be reduced. It would be distinct from Whitley Committees and all other official machinery, it would have no axe to grind, it would be a league of enthusiasts determined by every means in their power to maintain their public utility; to gain and maintain a public reputation for efficiency and economy as we understand it. It would give serious consideration to every suggestion made by its members, it would, above all, encourage and foster the spirit of co-operation and pride in craft without which it seems to me, there can be no real progress.

I commend the idea to you in all sincerity. You have the machinery or the organisation in your Postal, Telegraph and Telephone Society. The one weakness of this and similar societies is that they are merely debating societies, relying upon outsiders like myself to arouse the curiosity of their members. If, in addition to meetings of this kind you arranged ordinary meetings of your members for the purpose of discussing even local problems you would be starting your journey along the road which I have pointed out. You could apply it to all three departments. Let Birmingham make a start on the telegraph side.

(To be continued.)

PROGRESS OF THE TELEPHONE SYSTEM.

THE total number of stations working at April 30, 1926, was 1,399,848. During April 21,347 new telephones were added to the system, counterbalanced by 11,652 cessations.

The growth for the month of April is summarised as follows:—

	London.	Provinces.
Telephone Stations—		
Total at April 30	492,204	907,644
Net increase	3,705	5,990
Residence Rate Installations—		
Total	99,128	165,414
Net increase	1,295	1,941
Exchanges—		
Total	109	3,918
Net increase	1	7
Call Office Stations—		
Total	4,470	15,952
Net increase	25	97
Kiosks—		
Total	256	1,753
Net increase	11	69
New Exchanges opened under Rural Development Scheme—		
Total	—	888
Net increase	—	6
Rural Party Lines—		
Total	—	9,876
Net increase	—	4
Rural Railway Stations connected with Exchange System—		
Total	—	765
Net increase	—	3

The following brief review of Trunk statistics for the year 1925-26 may be of interest.

The total number of inland calls dealt with was 86,001,248, an increase of roughly 9½ millions, or 11% over the traffic for the previous year.

The number of Trunk calls originated from the London Exchanges during the past year was 11,001,002 of which 7,719,595 or 70% were passed through the London Trunk and Toll Exchanges.

A comparison of the inland Trunk statistics for the two past financial years is given below:—

	1924/25.	1925/26.	Increase.	
No. of Trunk Calls	77,288,439	86,001,248	8,712,809	11%
No. of Exchange Lines (mean for year)	769,456	838,813	69,357	9%
Average No. of Trunk Calls made per Exchange Line	102	103	1	1%
No. of Trunk Circuits at end of year	11,636	13,075	1,439	12%
Average No. of Trunk Calls made per working day	250,124	278,321	28,197	11%

The closing month of the financial year 1925-26 was noteworthy for the opening up of direct telephonic communication with Germany, restricted service being inaugurated between London and Berlin and other German towns on March 19 last. Between March 19-31 505 calls were made to Germany, 156 of which were Contract Calls.

During the past year altogether 224,187 calls were made to the Continent, representing an increase of 21,808 or 11% over the total for the previous year.

An analysis of the growth in Anglo-Continental traffic is given in the table below. Whilst there was a decline of 4% in the number of calls made to Belgium, calls from Belgium shewed an increase of nearly 7% over the total for the previous year.

OUTGOING CALLS 1925/26.

	No. of Calls.	Increase over last year.	Percentage increase.
To France	118,705	3,351	3
To Belgium	35,064	1,629 (dec.)	4 (dec.)
To Holland	66,826	19,102	40
To Switzerland	3,087	479	18
To Germany	505	—	—

The total number of calls coming into the country during the year 1925-26 was 265,414 or 54% of the bothway traffic. 47% of the French calls was originated in this country, 39% of the Belgian, 48% of the Dutch, 54% of the Swiss and 60% of the German.

It is estimated that the number of effective calls originated during the year ended March 31, 1926, was 1,016 millions, an increase over the total for 1924-25 of 87 millions of 9.4%. This is the first occasion on which the total has exceeded 1,000 millions. The estimate for the London Telephone area is 408.5 millions and for the Provincial districts 607.5 millions, compared with 362 millions and 567 millions respectively in the preceding year.

Further progress was made during the month of May with the development of the local exchange system. New exchanges opened included the following:—

LONDON—Primrose Hill, Kelvin.

PROVINCES—St. Andrews, Openshaw.

and among the more important exchanges extended were:—

LONDON—Willesden.

PROVINCES—Bourne End, High Wycombe, Liverpool (Central).

During the month the following additions to the main underground system were completed and brought into use:—

Ipswich—Norwich.

Exeter—Plymouth (Section of Bristol—Plymouth cable).

Dumbarton—Alexandria.

Sheffield—Rotherham.

while 165 new overhead trunk circuits were completed, and 144 additional circuits were provided by means of spare wires in underground cables.

REVIEW.

“Elementary Electrical Engineering.” By O. R. Randall, Ph.D., B.Sc., A.M.I.E.E., Wh.Sch. (Published by Sir Isaac Pitman & Sons, Ltd., London. 233 pp. Price 5s. net.)

This book has been written for the use of students attending a lecture and laboratory course in a Technical School or University. It assumes that the reader will be working under the guidance of a teacher, and that at each stage of his work he will be able by actual experience to test the facts which he has learnt.

The whole ground of elementary electrical engineering is covered, from the simplest direct current phenomena to three-phase alternating current working secondary cells, and lighting and photometry.

The treatment of the various subjects dealt with is necessarily somewhat condensed, owing to the wide field which the author covers in the comparatively small space at his disposal. The course student, for whom it is designed, will, however, find the book amply full enough to supplement his lecture notes, and it can also be recommended to any one who wishes to obtain a good and comprehensive account, in a small space, of the principles of modern electrical engineering.

TELEPHONE NOTES.

Telephony announces that long distance telephone communication between Mexico and the United States will probably be established by Jan. 1, 1927.

The most important link on the new system will consist of a line connecting Mexico City with Tampico and Neuvo Laredo (Texas) a distance of about 1,125 miles. At the outset three circuits will be carried on the poles of the National Railways, but the Telephone and Telegraph Company will erect its own pole route later on.

It is anticipated that each circuit will carry 40 calls daily.

The proposed charges for three minutes' conversation will be about 15 dollars between Mexico City and New York City, and 7.50 dollars between Mexico City and Neuvo Laredo (Texas).

* * *

Some interesting experiments in secret wireless are to be carried out from Rugby shortly, says the *Telegraph and Telephone Age*.

Speech will be sent out in an extremely distorted form and will be completely unintelligible to the ordinary listener. The receiving apparatus in America will be designed to filter this distortion and restore the speech to its original clarity.

This should effectually prevent eavesdropping, for the filtering apparatus is very complicated and costly.

Another system which ensures even greater secrecy is to have the degree of distortion rapidly varied several times a second. In this case the receiving apparatus has to be perfectly synchronised with that employed in the transmitter before the distortion can be smoothed out.

* * *

In a recent article in the *Electrical World* emphasis is placed upon the need for catching complaints of any description at their source. This is certainly not a new doctrine so far as the Post Office Telephone Service is concerned. The *Electrical World* points out that, when a person becomes so courageous or so angry as to complain to Headquarters, it may be taken for granted that he has first told his troubles to his friends and associates, and that after the complaint has been handled he will feel either victorious and crow, or disgruntled and "crab." In short, any complaint that reaches Headquarters makes for bad public relations, no matter how ably it may be handled.

* * *

Mr. Richard H. Ranger, the inventor of the wireless photographic device used for the commercial trans-Atlantic wireless photographic service inaugurated on May 1, forecasts, in a contribution to *Telephony*, the possibility of his invention being improved and adapted to the telephone so that persons talking over the telephone can see each other. It takes 20 minutes to transmit a picture at present, and when the apparatus can be perfected to admit of the transmission of a photograph in one tenth of a second, it will be possible to adapt it to the telephone.

* * *

The activities of the British Broadcasting Company have added one more item to the already multifarious tasks of the Post Office.

Apart from the administrative aspect of broadcasting, officers of the engineering and traffic staffs are responsible for the selection of suitable junction and trunk lines to enable the sweet song of the nightingale, the impressive music at a cathedral service, or the hurry and bustle consequent upon the departure of a cross-Channel steamer, to be carried to selected broadcasting stations for radiation.

Special types of conductors have to be selected, and the general rearrangements necessary in order to afford the facilities required, are, at times, of a complex character. In only one out of the large number of requests for circuit links in connexion with broadcasts by the British Broadcasting Company has it been impossible for the Post Office to supply the necessary trunk and junction facilities.

* * *

The inauguration of the night telephone service between England and Germany on March 15, 1926, marks one of the first stages in the maturation of the widespread proposals for the extension of European international telephony made at the Paris Conference in 1924. There is no doubt that this service is a success. In two months the daily number of unit calls has increased by about 30%. The service is now open from 5 p.m. (Mondays to Fridays) and from 2 p.m. Saturdays.

* * *

The important and long desired facility of telephone communication with other parts of Scotland was inaugurated on April 14, 1926, at Wick and Thurso. To the fishing industry in particular the provision of the direct Inverness-Wick trunk line should prove a great boon. It will, before long, be possible to communicate by telephone from Wick and Thurso to any part of England, and no doubt, in time, to the Continent.

H. J. E. S.

CORRESPONDENCE.

AUTOMATIC TELEPHONES.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

ON page 186 of the May number of the *Telegraph and Telephone Journal*, the figure of 1,496,000 telephones is given for such as are operated on a machine (automatic) basis in America.

Since the statement is abstracted from the Annual Report of the American Telegraph & Telephone Company, the figures, naturally, only apply to the Bell System.

It will probably interest your readers to know that this does not represent the total number of automatic telephones in America. The Independent Companies have installed approximately 500,000 lines of Strowger equipment, thus making a total of 1,996,000 lines in all, established on an automatic basis.

In Europe—excluding England—the number of lines equipped on the Strowger System is as follows:—

Operating	... ..	415,000
In course of erection	... ..	163,000
On order	... ..	488,000

(including Berlin 153,000).

In America, of the 1,996,000 lines operating automatically, approximately 1,100,000 lines are operating with Strowger equipment.

H. H. HARRISON.

Automatic Telephone Manufacturing Co., Ltd.,
Milton Road, Edge Lane, Liverpool.
June 29, 1926.

C.B. CLAY FOOTBALL CHALLENGE CUP FINAL.

THE final match for Season 1925-26 in connexion with the above Competition was played on Friday, April 23, 1926, on the ground of the Tufnell Park Football Club. The competing teams were the Stores Department (Holloway) and City External Section. A splendid game was witnessed by about 500 enthusiasts. The sides proved to be very evenly matched, and after a "ding-dong" struggle the City External team ran out winners by two goals to one.

In the unavoidable absence of Colonel C. B. Clay, Mr. R. A. Weaver presented the silver cup and medals to the winners.

The proceeds of the match (which amounted to £77) were devoted to the Merritt and White Relief Fund. It will be remembered that Messrs. W. F. Merritt and A. W. White (City External) recently lost their lives in the performance of their duties in the City district.

The Annual General Meeting of the Competition will be held at Denman Street (Refreshment Room) on Monday, July 12, 1926, at 5.45 p.m. All interested in the welfare of sport are invited to be present.

LONDON TELEPHONE DIRECTORY.

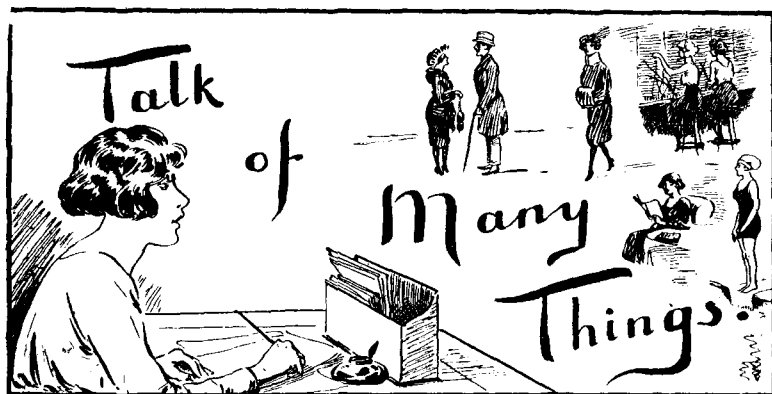
IN connexion with the gradual introduction of automatic telephone working in London, arrangements are being made in the next (October) issue of the London Telephone Directory to print in heavy type capitals the first three letters of the names of exchanges within a radius of ten miles from Oxford Circus. Opportunity is also being taken to effect economies in space by using a three-column in place of a two-column setting; by entering the exchange name and number after the address instead of before the subscriber's name, and by abbreviating the longer exchange names, subscribers' addresses and descriptive matter.

In consequence of these changes it will be necessary for the Directory to go to press earlier than usual, and any person who contemplates the installation of a telephone and desires his name in the main portion of the forthcoming Directory should arrange for his order to reach the London Telephone Service not later than July 3 next. Orders for new lines received after that date and not later than September 1 will be placed in an addendum at the beginning of the Directory.

Alterations to existing entries, or additional entries for existing subscribers must be received not later than July 3. Communication on the subject should be addressed to the Controller, London Telephone Service, Cornwall House, Waterloo Road, S.E.1.

GENERAL POST OFFICE, June 18, 1926.

WE TELEPHONISTS



A Train of Thought.

THE train slowed, hesitated, and finally, as though in doubt or reluctance, it came to a stop. The rhythmic sound of its wheels ceased: the rush, roar and rattle gave place to a singular quietness. The hiss of steam from the engine in the distance seemed only to intensify the silence. Outside the wind sighed gently in the ventilators and the grass on the banks bowed and beckoned, inviting me out of the train to rest amid the bright flowers and under the trees. The cows browsed contentedly and on occasion threw a glance of placid surprise at the deluded passengers who were leaving green cool pastures and clear flowing streams for hot city streets and muddy gutters. Wisps of wool moved dreamily in the sky and cast brief, fleeting shadows on the woods and fields.

Inside, the noisy chatter of the compartment was hushed. Previously the rhythmic hum of the carriage wheels had been the music to the animated chatter of the travellers. There had been open talk and joyous laughter, but the inactivity of the train seemed to have been communicated to the people and a suspicious reserve had descended upon them. Conversation had dropped to a whisper just as though we were in church, or in a dentist's waiting-room. Actions which had been frank and open became an impertinence. It was no longer possible without self-consciousness to read the next man's paper, and the contemplative glance at the young couple in the corner appeared suddenly to have developed into a rude stare.

It is difficult to know how to behave in such circumstances. It is foolish to stare at the roof and equally senseless to gaze at the floor. It hurts the neck to look out of the window for long and it is unconvincing to feign sleep, especially on the morning train. The oppressive silence makes it difficult to concentrate upon a book, and, moreover, should the book be humorous, it is so inane to chuckle and gurgle. Fortunately some wise student of human nature has decreed that official notices shall be displayed in railway carriages. It cannot be, a we might suppose, that these notices are there so that passengers may learn what they may and may not do. No one, I should imagine, would dream of reading railway notices with that object, and surely the companies are not deluded with such a belief. No—these notices must be provided in order to afford occupation and mutual relaxation to passengers when the train stops between stations. Take that charming couplet "To stop the train, Pull down the chain"—spoiled in my judgment by its postscript. Who would spend £5 in this way when the train does it by itself and free of charge? Then there is the notice "This rack to be used for light articles only"—probably an extract from "Operating Procedure" by Torquemada. The one which exercises my imagination most, however, is "Passengers are warned not to lean their heads out of the windows." How very thorough and all-embracing this is. It provides not only for the ordinary single-headed person, but also for those who are multi-headed and for those who, being endowed with more than one head, lean them all out of both windows at once. Perhaps this notice was designed to cover members of travelling circuses, but I must confess that I should like to meet someone who could thoroughly and effectively break this rule. Finally, I considered that other prohibition "Do not spit—Penalty 40s." There are times when, having run for my train on a hot day, I—but at this point the engine gave an excited little shriek, and we moved on.

PERCY FLAGE.

We ourselves have spent many a despairing hour in our journeyings up and down wrestling with that dark and terrible stanza:—

"Pa and Ma and Tommy, Lucy and Lucette,
Travel now in safety insured by the Southminster Gazette."

Can any of our readers quote a worse last line? [If so, don't.—Ed.]

Word Dreams.

(Written in response to the affecting cry of Mr. Percy Flage.)

Holidays! I fell to dreaming. Dreaming of all the things that holidays mean; and I saw the sweep of a white clad cliff—golden sands fringing the glittering sweep of sea, and over all, "that inverted bowl we call the sky," serene and calm, giving an atmosphere of peace and rest. A perfect picture—to me!

Then, the word holiday continually recurring to my mind in the curious way that words have, I suddenly remembered that we should, perhaps more

correctly, say holy-day. Then pictures of an altogether different description came into my mind.

First of all came the vision of the saints of the calendar of the Holy Roman Church, as portrayed by any of the Italian painters. Spectres of anaemic-looking ladies and gentlemen, clad in pre-Raphaelite robes, complete with halos and emaciated hands, passed across my field of sight in melancholy procession.

Then, as the tapestry of my thoughts unrolled itself, pictures of more robust people came to me, devout men and women, who, on days set apart for the purpose, worshipped at the shrine of their patron saint. First came the lady on her milk-white palfrey, then the gallant knight on his gaily caparisoned charger; following were the humble serf and the jolly old mendicant friar—all with one ostensible object in view—to observe the ritual of a holy-day, and to have a holiday while freed, for a while, from the common round.

Then I thought of the days when, in ancient Greece and Rome, on days dedicated to the various gods, wild orgies took place which were anything but holy. Of the feasting and games, of the sacrifices to Jove and Venus, I thought; and as I thought I realised how such holidays meant relaxation only for the patricians, while for the more humble people and slaves there was only work.

Practical consideration then came uppermost, and I came to the conclusion that, if we do live in an age which is less colourful than some which have gone before, it is one which does at least give us the advantage of a few weeks' holiday which are absolutely free from the tradition of past holy-days.

E.M.M., Regent Exchange.

R. I. P.

In ever loving memory of
L. T. S. BANK
who passed away June 5th, 1926.

'Twas on Saturday she left us—
How we miss her loving face,
All her daughters will remember
None on earth can take her place.

Gone—but not forgotten!

It is said that a cat has nine lives. If so, Bank, whose demise we now mourn, was surely the most feline of our Exchanges; for she has been condemned to death more times than we can remember. Hopelessly out-of-date as a crinoline at Ascot in this year of grace, Bank, with her flat multiple and upside-down-working, exercised a fascination of her own up to the last; and what is more, gave good service. From the technical point of view, Bank was a standing contradiction of the doctrine of the survival of the fittest; and a brilliant example of the fact that it is the staff, even more than the equipment, that makes the service.

Until last week none of us really realised that Bank was to die; and even when the construction staff began its appointed work of destruction we smiled bravely. It was until the fateful Saturday morning when we heard the tense, dramatic words "It's over, Central," that we fully realised that the curtain had fallen on a stage which, though dim its lighting and mean its furniture, was nevertheless full of the ghosts of happy memories. For always "the play's the thing," and can transfigure the meanest setting.

Another sad parting was with Dick, the Exchange cat. Dick, despite the name, was a lady; and we had hoped that she would have been transferred with us; but the Fates willed otherwise. So we decided that transfer to an accredited Cats' Home would be the next best thing—a decision which to the cynic was not without a touch of humour. But to judge from the expression on Dick's face when captured, she did not see the joke.

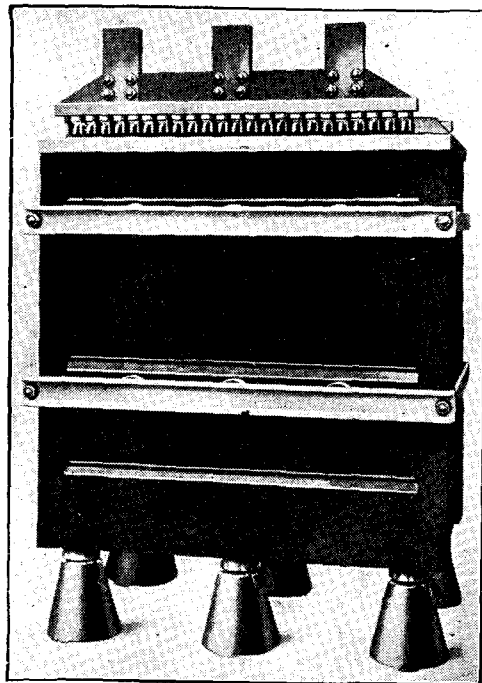
However, good-bye Bank—and Dick. Even a cat must die.

I.L.W.

BANK—

Once in the front rank,
Of Exchanges, to be frank,
You sank,
As your subscribers shrank—
Till left a blank,
No more you swank.
Of wire full many a hank
Now lies both loose and lank,
Your floor to the last plank,
Your cupboards dark and dank.
Empty your battery tank,
Where native and passing Yank
Alike to your health have "drank,"
Soon will be heard the clank
Of chisel and pulley crank
Attacking thee in the flank.
Yet would I pause to thank
Your staff of each class and rank,
Who with no time for prank
The City man's surest anch—
or, made of thee, dear old Bank! —TIM O'ROUS.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," *Telegraph and Telephone Journal*, Secretary's Office, G.P.O. (North), London, E.C.



Chloride Batteries

for

Telephone Exchanges.

Many of the largest Telephone Exchanges in the country have Chloride Batteries installed.

The battery plant being installed at the new Holborn Telephone Exchanges comprise four Chloride Batteries, each of 25 cells.

Each cell contains 71 plates, and the total weight of each cell, including acid, is 4,600 lbs.

These will be the largest cells in service in this country for telephone work.

THE Chloride ELECTRICAL STORAGE COMPANY LIMITED.

CLIFTON JUNCTION
Near MANCHESTER

137 VICTORIA ST.,
LONDON, S.W.1

THE LARGEST BATTERY WORKS
IN THE BRITISH EMPIRE.

Use Chloride Batteries for House Lighting

WHERE TO STAY.

The attention of our Readers is directed to the following list of Boarding and Apartment Houses.

BEAUTIFUL BUTTERMERE.—Near Honister Pass, Great Gable, Red Pike and many easier climbs. VICTORIA FAMILY HOTEL (R.A.C. & A.A.) Inclusive tariff £3 3s. May/June, £4 4s. July/August. Take taxi from Cockermouth. Write for card of particulars.

DEAN FOREST.—SEVERN-WYE VALLEYS. Beautiful Holiday Home (600 ft. up). 70 rooms, extensive grounds, motors, golf, billiards, tennis, bowls, croquet, dancing. Electric light. Boarders 47s. 6d. to 65s.—Prospectus: Littledean House, Littledean, Glos.

MIDHURST.—Lady and Son living near Midhurst can take one or two paying guests. Beautiful scenery. Fishing, Garden, Wireless. Half a mile from bus route.—£2 weekly.

SANDOWN, I. of W.—Comfortable Board Residence, best part of town. Three minutes from sea and pier, electric light, bath, liberal table, terms moderate.—Mrs. Colenutt, "Roseberry," New Street.

SANDOWN.—"Seacroft," Private Hotel. Comfortable Board-Residence on cliff facing sea. Large grounds, Croquet, Putting free. Electric Light, Separate Tables.—L. & E. Woodford.

SHANKLIN.—"Summerhill," *en Pension*. On cliff, 2 minutes sea. Separate tables. First class chef. Reduced terms, early holidays. Phone 184.

The United River Plate Telephone Company, Limited,

require for Buenos Aires a Telephone Engineer with experience in design of aerial and cable trunk lines and routes; also knowledge of circuits, repeating equipment, transmission, &c. Age about 30 to 35; commencing salary offered about £800 per annum (English living equivalent, say, £600 per annum for single man); five years' contract; 1st class passage.—Apply by letter stating full particulars to 5, London Wall Buildings, Finsbury Circus, London, E.C.

Silk and Cotton-Covered H.C. Copper Wire,
Asbestos Covered Wire,
Charcoal Iron Core Wire,
Resistance and Fuse Wires,
Binding Wires,
&c., &c.

P. ORMISTON & SONS,
ESTABLISHED 1793.
79, Clerkenwell Road, London, E.C.
"ORMISTON, LONDON."
13259 CENTRAL.

Braided and Twisted Wires,
Bare Copper Strand and Flexibles of any construction. Wire Ropes and Cords, down to the finest sizes, in Galvanized Steel, Phosphor Bronze, &c.

A REPLY TO EDGWARE.

(Vide p. 208, June issue.)

Oh, cease your jeers at the Engineers.
 Nor treat them all as mystics.
 The theories they propound, I say,
 Are based upon statistics.
 On figures weird, and it is feared
 These sometimes are illusive,
 Although supplied, it's not denied,
 By a Body most exclusive.
 (I thus refer, though p'raps I err,
 And so the point don't stress,
 To that awesome band of gentry grand,
 Known as the L.T.S.)
 This clever crew, with much ado,
 A fundamental law passed,
 Which states that they, and only they,
 Can accurately "forecast."
 So day by day they toil away
 And many hours are spent,
 Without a doubt, on working out
 Some fresh "development."
 Forecasts you see, apparently
 Depend upon the weather,
 So obviously they can't agree
 For many days together.
 They twist about, turn inside out,
 In manner strange and shifty,
 And we are told, in accents cold,
 To "boost 'em up by fifty."
 The Engineer (poor little dear),
 When given data new
 To work upon, will find ere long,
 He's met his Waterloo.
 He'll ruminate, investigate,
 And come to a conclusion
 Which he submits, to find that it's
 Been based on a delusion.

TIM IDER.

ANGLO-GERMAN TELEPHONE SERVICE.

As from July 1st, in addition to the restricted service in force between London and certain cities in Germany, one circuit will be available for continuous day and night service between London and Berlin.

PRESENTATION TO MR. W. DAVIDSON, ABERDEEN.

On the occasion of his promotion to Traffic Superintendent, Class II at Liverpool, Mr. W. Davidson, Assistant Traffic Superintendent, Aberdeen, was presented with a handsome walnut timepiece, with Westminster Chimes, by his colleagues in the Aberdeen District. The presentation was made by Mr. Edmond, District Manager, who referred to Mr. Davidson's previous service, and to the splendid relations which had always existed between Mr. Davidson and the staff. Mr. Edmond's remarks were endorsed by Mr. Forrester, Traffic Superintendent; Mr. Clow, Chief Clerk; Mr. Coulsell, Contract Manager; Mr. Glover, Sectional Engineer; and Mr. Smith, Traffic Officer; on behalf of the Traffic and Operating Staffs.

In reply, Mr. Davidson thanked the staff for their splendid gift, and while he regretted having to leave Aberdeen, he looked forward to taking up his duties in his new sphere. He assured them that he would not forget his many friends in the North, nor the very pleasant time he had spent in Aberdeen.

PRESENTATION TO MR. MEIKLEHAM, GLASGOW.

On May 28 an interesting function took place in the District Office of the Scotland West, Telephone District, viz.: a presentation to Mr. Meikleham, the Contract Manager, who is departing to take up a similar position at Newcastle-on-Tyne on promotion. Mr. Gauntlett, who occupied the chair, and was supported by all the principal officers and many of the staff, referred to the fact that Mr. Meikleham had been in the Scotland, Western District, for between 5 and 6 years, and was known to most for his cheery disposition and optimistic temperament, and the department had no more zealous officer than he. He had done a lot to develop the District especially in the way of opening Rural Exchanges, of which he could account for about 60. Reference was also made to Mr. Meikleham's social work for the poor boys of Glasgow. Mr. Gauntlett then presented Mr. Meikleham with a large travelling case for himself, and remarking that as Mr. Meikleham had no doubt much to thank his wife for, the staff wished to give her for her own use a hand-bag. Mr. Hill, Traffic Superintendent; Mr. Marshall, Chief Clerk; and Mr. Dalziel on behalf of the clerical force, supported the Chairman's remarks in wishing Mr. Meikleham God-speed and every prosperity in his new District.

LONDON TELEPHONE SERVICE NOTES.

Sports Association.

The Sports Association, which was formed recently, is getting to work, and a circular addressed to every member of the L.T.S. has been prepared and will be issued shortly. The Executive Committee recommend as a first step that as much support as possible should be given to the Civil Service Sports Council since it is through this body that adequately-equipped sports grounds can be provided.

A keen sense of rivalry in sport between the different branches is in evidence, and already several cricket matches have been played and other fixtures have been arranged.

* * * *

Cricket.

A.G.D. versus L.T.S.

These two Departments met for the first time in a representative match at the Civil Service Sports Ground at Chiswick, on March 25.

The L.T.S. team consisted of Messrs. Drabwell, Smith, Moyle and Widdings (Accounts Branch); Giles, Wright, Cowdrey and Oliver (Contract Branch); Grove and Pounds (Capt.) (Traffic Branch).

The L.T.S. team batted first and were all out for 69 runs, the best scores being made by Cowdrey (12), Giles (11), Drabwell (11 not out) and Oliver (10). The A.G.D. team replied with 127 runs for six wickets, and so established a very decided superiority. There will be a return match.

CONTRACTS versus TRAFFIC.

These two Branches met in a match at Battersea Park, the Traffic Branch gaining an easy victory by 90 runs to 32.

CONTRACT BRANCH.		TRAFFIC BRANCH.	
Staples, b. Shepperd	... 0	Cracknell, b. Giles	... 3
Wilson, b. Shepperd	... 2	Shepperd retired	... 32
Giles, b. Holdstock	... 11	Mears, b. Cowdrey	... 4
Cowdrey, b. Shepperd	... 7	Holdstock, c. & b. Giles	... 31
Oliver, b. Holdstock	... 2	Adams, b. Giles	... 7
Culpin, b. Holdstock	... 0	Hancock, b. Cowdrey	... 1
Culley, c. & b. Green	... 1	Green, b. Giles	... 0
Davis, not out	... 1	Berry, c. & b. Giles	... 0
Fordham, b. Holdstock	... 0	Ritchings, b. Porter	... 2
Ballard, b. Green	... 0	Maier, c. sub b. Giles	... 3
Durham, b. Berry	... 2	Webb, not out	... 0
Extras	... 6	Extras	... 7
Total	... 32	Total	... 90

* * * *

Lotos Swimming Club.

This club is now in full swing for the season, with its headquarters at the Great Smith Street Baths. There are signs that this will be the club's most successful year, and the committee are arranging an attractive programme in order to maintain the excellent attendances on club nights.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage:—

- Miss K. E. LAWDAY, Asst. Supr., Cl. II., of the Bank Exchange.
- Miss M. G. TOMS, Asst. Supr., Cl. II., of the North Exchange.
- Miss N. E. PEAKE, Telephonist, of the Putney Exchange.
- Miss M. L. HITCHCOCK, Telephonist, of the Central Exchange.
- Miss IVY M. TRICE, Telephonist, of the Riverside Exchange.
- Miss A. E. BLACKER, Telephonist, of the Holborn Exchange.
- Miss M. E. R. BRETT, Telephonist, of the Museum Exchange.
- Miss E. R. SILENCE, Telephonist, of the Trunk Exchange.
- Miss D. I. LAW, Telephonist, of the Trunk Exchange.